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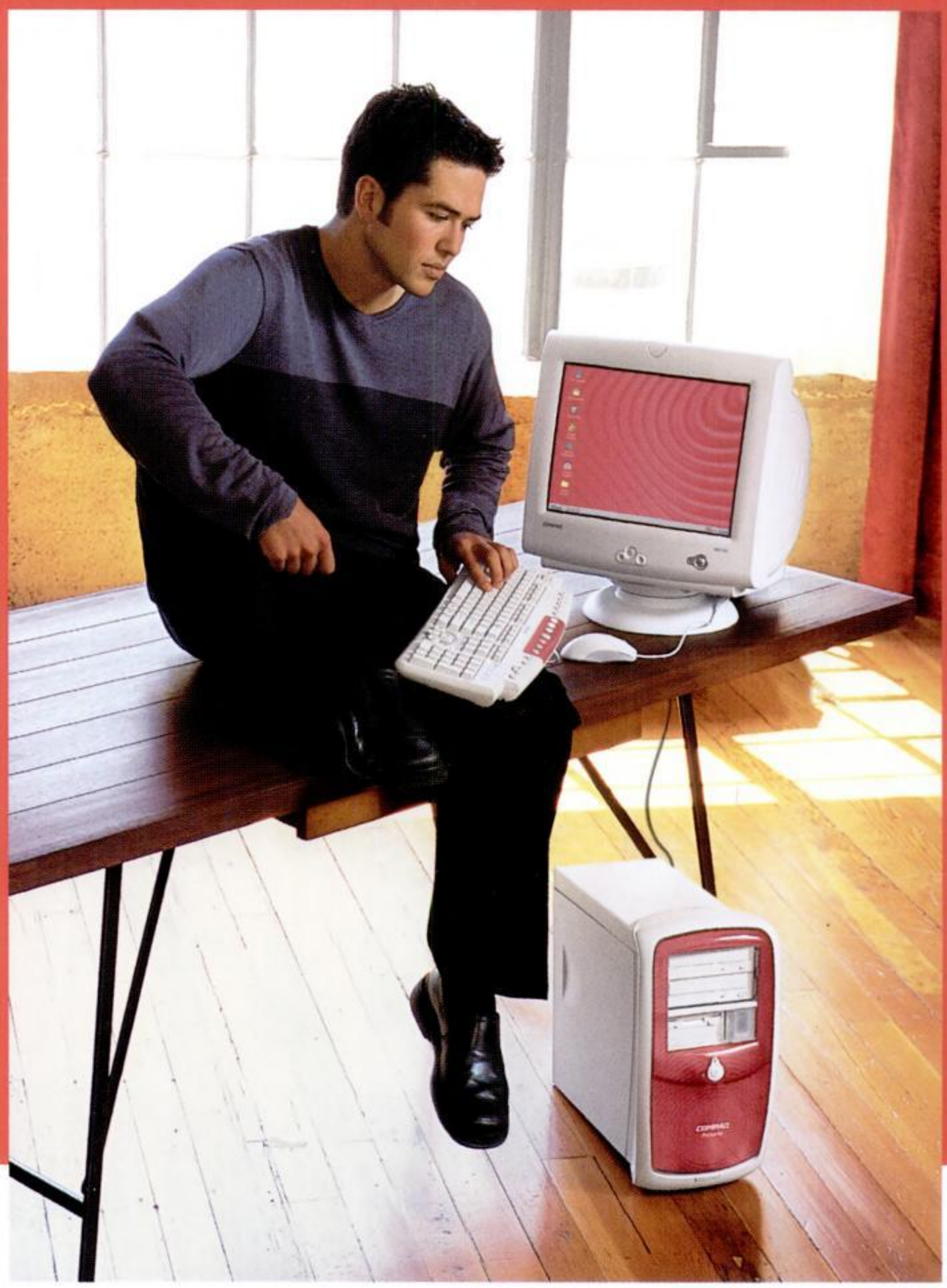

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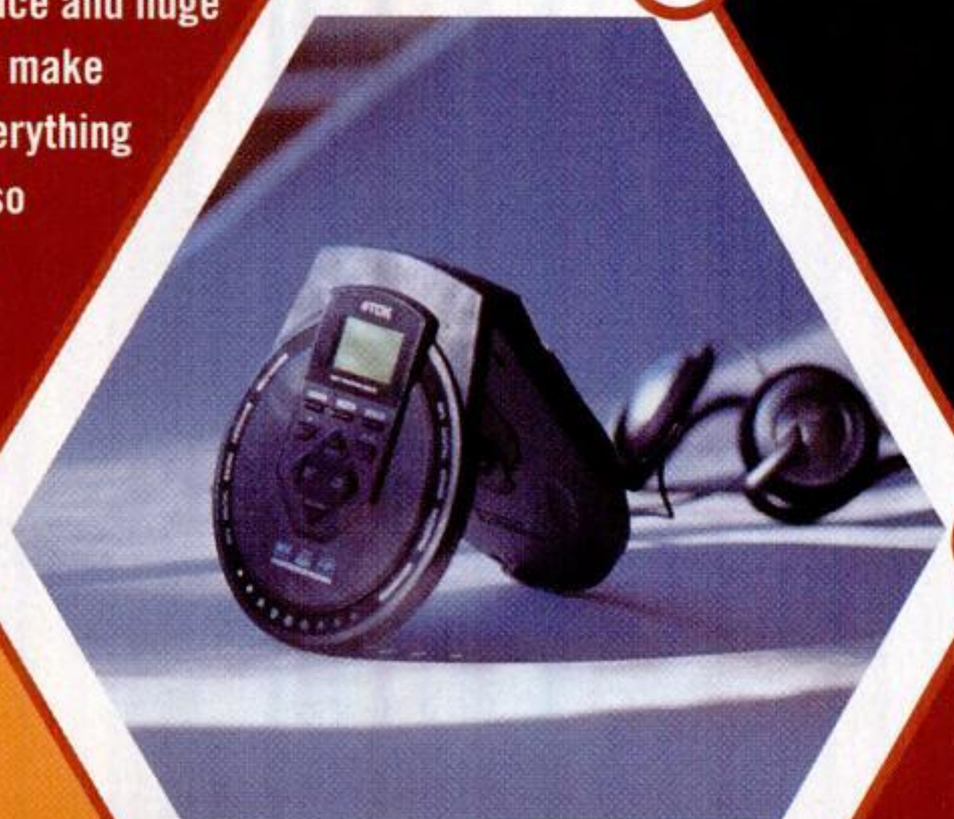

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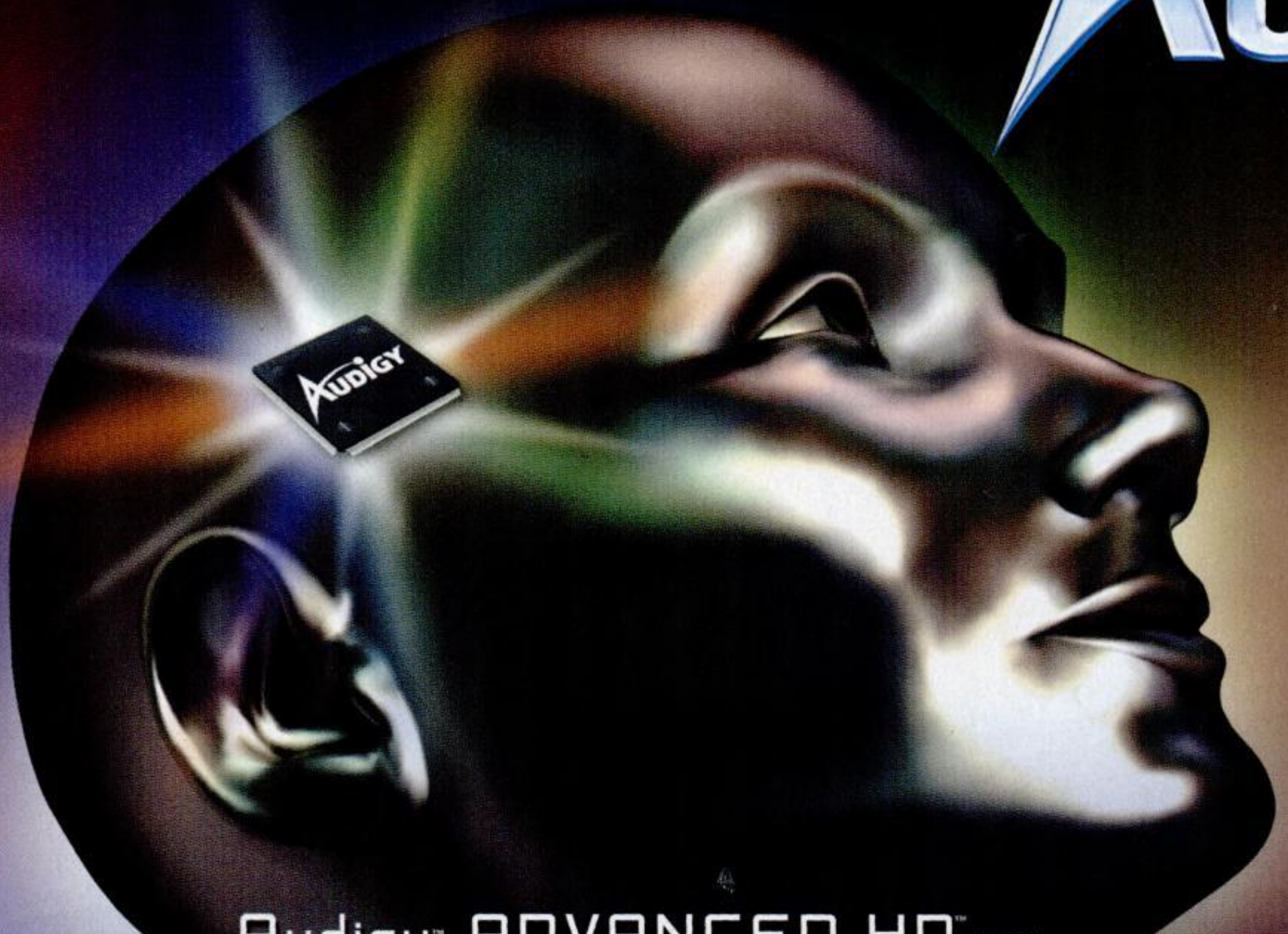

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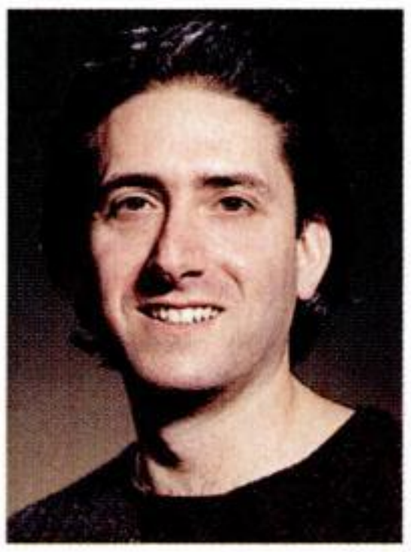

Our hearts go out...

Any attempt to relate the attacks on September 11 to some aspect of PC upgrading runs counterintuitive to our sense of scale. In the big scheme of things, our shared enthusiasm for computer technology means very, very little. In fact, I'm sure most *Maximum PC* readers would give up not only their PCs, but also a lifetime of PC enjoyment, to reverse history and get back even just one of America's lost souls.

Our sympathies go out to all those touched by the tragedies in New York, Virginia, and Pennsylvania. Our sympathies also go out to the other 47 states, from Alabama to Wyoming. This was a *national* tragedy. We share a common grief, a common sense of anger, a common sense of duty.

If you're looking to act on your sense of duty, but aren't quite sure how, I have some suggestions. First, donations to charitable causes will make a difference. Many different groups are doing good things for the relief effort, but my money is going to the September 11th Fund (**http://september11fund.org**), which is responding to both the immediate and long-term needs of the victims and their families.

Second, please do your part as a privileged American citizen—become well-versed in the issues of the looming online privacy debate. This is one area in which *Maximum PC* readers might have special expertise, let alone a vested interest. The U.S. government is embarking on an unprecedented national security effort, and no measure should be either summarily disregarded or immediately approved. Are public encryption keys too strong or not strong enough? Should our government be afforded more tools to keep terrorists from using the Internet for nefarious deeds? These questions must be addressed, and informed opinions are really the only helpful opinions in the debate.

Third, don't give up your passions wholesale. Fun and diversion are hardly top priorities at this time, but they're important parts of lives worth living. They're also components of free expression, which is a democratic ideal we all must work to protect. To this end, you'll find this issue of *Maximum PC* is pretty much business as usual. On page 8, you'll find an important letter from our publisher regarding the attacks, and references also appear in our new Reader Pulse Polls section (page 10), and in Thomas McDonald's column (page 16). But in the main, this month's issue is about the shameless joy of PC passion, as well it should be.

If *Maximum PC* can offer even a few brief moments of relief to weary morales, then brothers and sisters, we've done well.

—JON PHILLIPS

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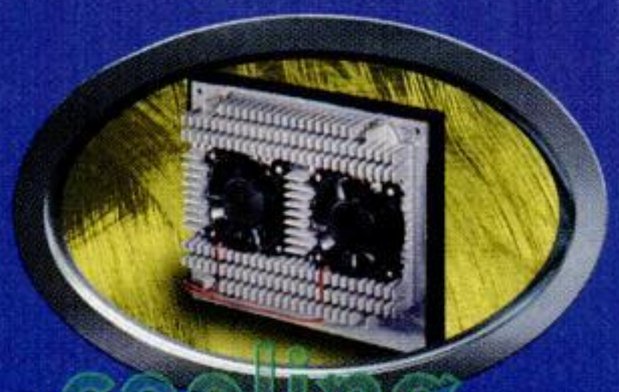

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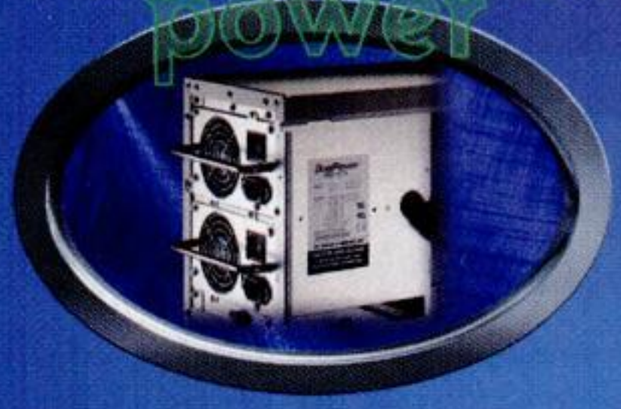

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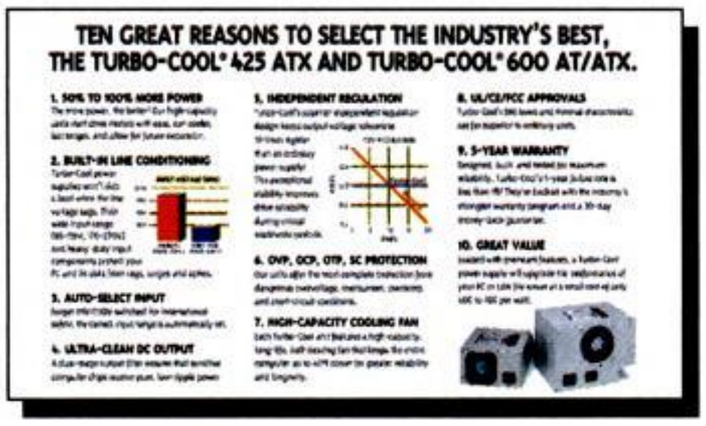

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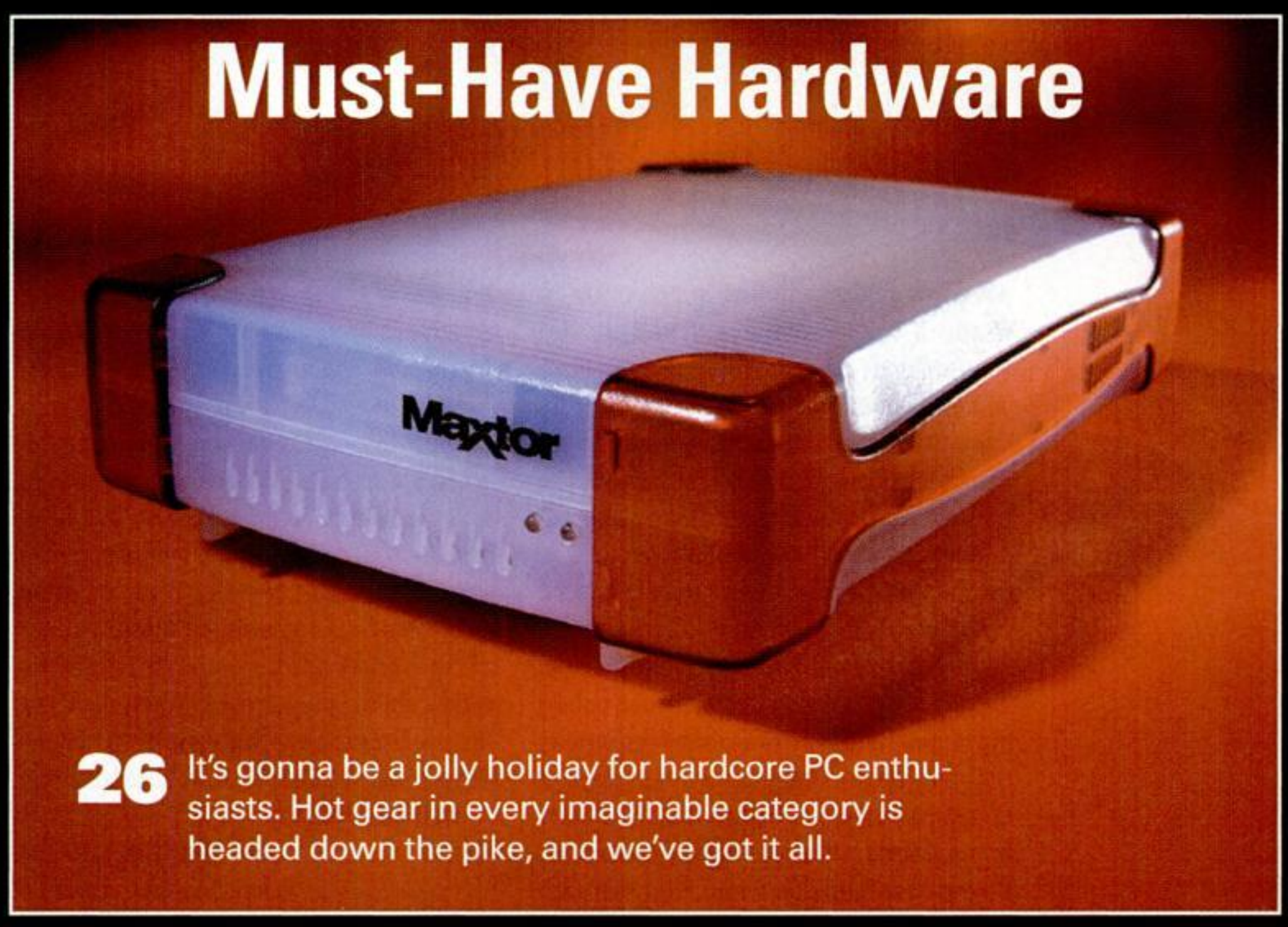
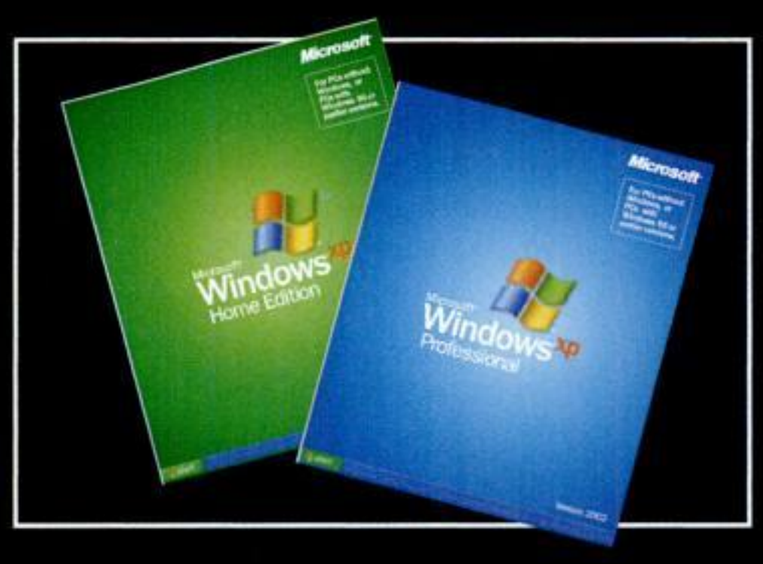
THIS MONTH'S **FEATURES**



26 It's gonna be a jolly holiday for hardcore PC enthusiasts. Hot gear in every imaginable category is headed down the pike, and we've got it all.



38 Windows XP Xposed!
With a schmancy new user interface, remarkable stability, and great performance, Microsoft's new OS earns *Maximum PC*'s highest verdict.

42 Your Field Guide to North American CPUs
We take you on safari through Silicon Valley and take aim at the processor species that roam the range.

48 Core Competency
Our chipset guru Tom Halfhill fills us in on what to expect from the two top manufacturers' development teams as the CPU vendors fight for desktop dominance.

54 The 10 Best Multiplayer Games You're Not Playing
Break out of the single-player rut and discover what's happening in the busy world of online multiplayer gaming. There's a lot you're missing.

Printed material

In/Out

You write, we respond

Apologies and Sympathies from Maximum PC

Maximum PC **would like to apologize to readers who were disturbed by the PowerQuest ad that ran in the October issue. The ad ran because of an error by Imagine Media, the magazine's publishing company. In an effort to be sensitive to the tragedy, PowerQuest made every effort to pull this ad out of all publications. In fact, PowerQuest wasn't even aware the ad was running in *Maximum PC*, as another ad had been scheduled for our magazine. The ad was created and printed long before the tragedy and is meant to show the ability of *Drive Image* to maintain an exact image of a hard drive and restore the drive to its original state in the event of a system crash. PowerQuest and *Maximum PC* grieve with the rest of the world over the tragic and senseless loss of life that resulted from the attacks on September 11.**

Maximum PC **also joins Compaq Corporation in expressing deepest sympathies to the family, friends, and co-workers of Brian Magee, a Compaq employee and brother-in-law of Bernie Lanigan, *Maximum PC*'s East Coast Advertising Director. Brian was attending a meeting on the 106th floor of the World Trade Center at the time of the attack. Other Compaq employees who were lost are Brian Shaw, Susan Huie, and Elaine Greenberg. Jeff Coombs was killed onboard American Flight 11.**

—CHRIS COELHO
Publisher, *Maximum PC*

CABLING TIT...

OK, I love the mag. And I normally read it cover to cover to extract all the nectar from its nooks and crannies. But boy, was I disappointed to find you wasted five pages of print space and 30 seconds of my time on your "How They Do That Voodoo That They Do" article in October's cut. Funky case design and crazy colors add some much-needed spice to the has-always-been-the-most-boring part of PCs. But cable dressing? This is news? Here: Alleviates airflow and improves aesthetics. Fine and done. Contact Panduit [a company that makes cabling accessories] for more. I've been designing and building control cabinets for industrial machinery since forever, and we've always twisted wires and dressed ribbon cables along the cabinet walls. Keeps thing tidy, but it's not a big enough deal to write about. C'mon fellas! For custom tuners, this isn't hot news.

—PETER BRUNO

...FOR CABLING TAT

I thought I knew everything about custom modding, but your photostory on Voodoo's cabling tricks just plain schooled me! I've never seen—nor have I ever imagined—such amazing interior detailing. Reading that article was like attending a custom car show; their attention to detail is borderline loony. You can bet your bippy I'll be ripping apart my rig and using Voodoo's techniques every chance I get to improve my wiring.

Interior space, the final frontier.

—HECTOR MONTES

GAME THEORY

Some of Jon Phillips' comments regarding nVidia's GeForce3 3D chipset (October 2001 "Release Notes") sound utterly ridiculous. He claims the PC industry relies "first and foremost" on gaming to drive sales. I am no expert on the PC industry, but I am quite sure the vast majority of computers are purchased by businesses. Thus, the overall slowing of the economy would account for the downturn in PC sales. Even if I am incorrect in my assumption, I suspect most home PCs are bought by adults, who are not primarily interested in 3D gaming. After all, how many teenagers can spend $1,000 or $2,000 just to play computer games, especially if the videocard alone could cost more than a whole console system? I'll bet that the rich computer nerds, fixated on getting the highest possible frame rates, who buy these high-end systems, account for a small fraction of PCs sold. I may be over-generalizing, but I very, very highly doubt "The PC's very life depends..." on the success of nVidia/GeForce3 and 3D games.

—EUGENE PAI

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: I submit the following evidence: AMD's K6-2 with 3DNow!, K6-III with 3DNow!, and Athlon with 3DNow!, as well as Intel's Pentium III with SSE, and Pentium 4 with SSE and SSE2. These are the major processor and special instruction set releases from AMD and Intel during the last three years. Each of these CPUs and instruction sets was designed to accelerate 3D gaming, sometimes (in the case of the Pentium 4) to the detriment of business application performance. This tells us that the two major processor companies are acting on the supposition that PC gaming drives PC sales. Of course, this isn't a secret; AMD and Intel have stated as much during product briefings with journalists.

At this time, businesses don't need to upgrade their employee-level machines. They haven't needed to for the last 18 to 24 months. Business machines run fast enough for *Word, Excel, Internet Explorer,* etc. True enough, faster server machines are always helpful, but these aren't "per-

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sonal computers," and they're not a significant part of this argument.

On the flipside, gaming has driven PC sales since the advent of the first Sound Blaster soundcard, and it will continue to do so in the future. However, I was remiss in not mentioning that interest in MP3, PC home theater, and digital video will also drive upgrades going forward. For example, people might soon begin ditching their old machines in order to get new ones outfitted with FireWire ports, in order to perform consumer-level DV editing. That's a big part of the upgrading equation I should have addressed.

Adults aren't gamers? I wouldn't touch that one with a 10-foot joystick! It's our policy not to publish the e-mail addresses of letter-writers, but if we did, I suspect your in-box would be deluged with angry words from adult FPSers, RTSers, and RPGers worldwide.

THE SPY'S THE LIMIT

Thank you for your coverage of peer-to-peer file sharing software ("MP3 Survival Guide," September 2001) . Unfortunately, you decided not to mention that *KaZaA* and *Audiogalaxy Satellite* are chock-full of spyware! *KaZaA* has the Aureate browser parasite and Cydoor. *Audiogalaxy Satellite* has WebHancer, which, by the way, wasn't uninstalled with the rest of the program and persisted in trying to connect to its server after I uninstalled *Audiogalaxy Satellite*.

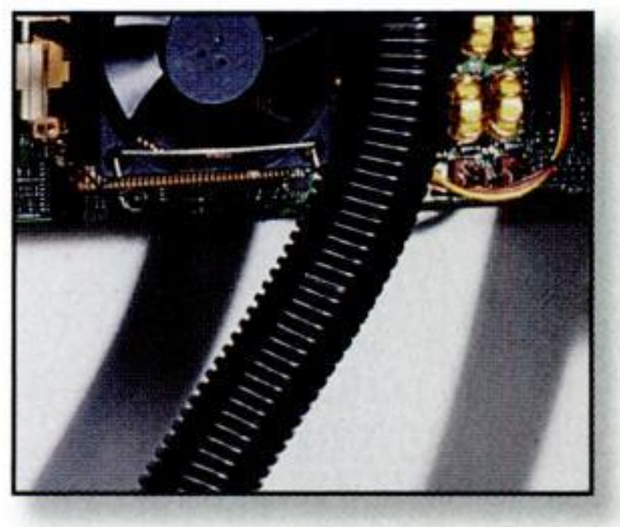
Either you didn't know about these flies in the ointment (and therefore look like dumbasses), or you didn't have the balls to inform us. Either way, your integrity is tarnished. May your own DOG bite you all! Please explain your failure to inform readers of the spyware in these programs.

—CHOPS

JON PHILLIPS REPLIES: Hmmm... Can we have a third choice? Such as: Because of space constraints, we focused on the software's essential usefulness and not its insidiousness, and maximum-level PC freaks should always be on the lookout for spyware anyhow? No? OK, we'll take your first option—dumbasses we are! For the record, any readers concerned about potential spyware should go to www.spychecker.com and use the handy online spyware database to determine if the software is a known offender. We also apologize to anyone who feels violated by our *KaZaA* and *Audiogalaxy Satellite* recommendations.

TUBING TALK

My roommate and I are automotive technicians, as well as big fans of your magazine. In the September issue, on page 37, in the sidenote "Ten Hutt," you state that the tubing around the wire loom is a "wire loom." The



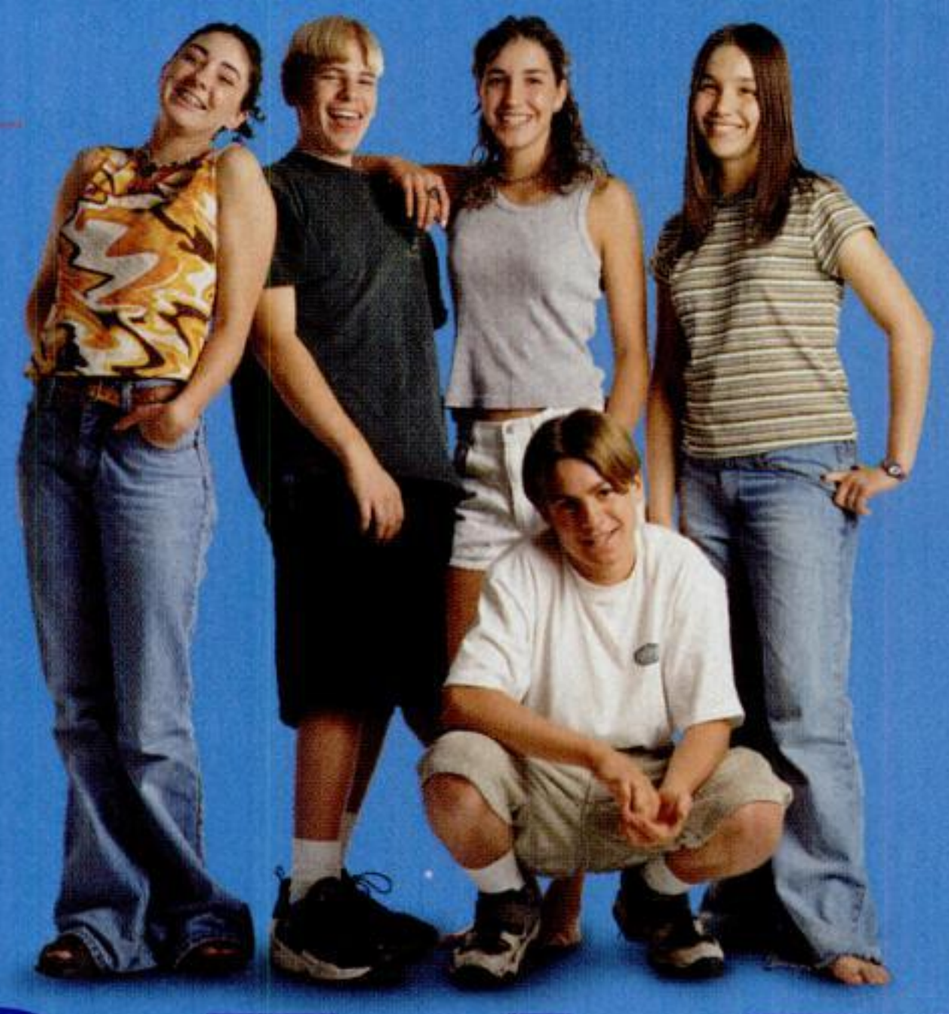
Wire loom?

Practice safe surf.

Thanks to cable and DSL, your family enjoys a far more exciting Internet experience. But if you're connecting around the clock, you might also be surfing some dangerous territory.

With NETGEAR's® Web Safe Router it's a snap to make up to four Internet connections family-friendly. Hardware-based firewall protection keeps hackers from getting into your home. And simple, selectable parental controls such as content filtering keep the kids from getting into the sites you object to.

For more information about the Web Safe Router and our expansive line of simple, affordable networking solutions for the home and office, visit **netgear.com** today.



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Reader Letters

fact of the matter is that the tubing is "convoluted tubing," and a "wire loom" is a bundle of wires, held together in no particular fashion. You could use zip ties, electrical tape, or convoluted tubing.

—JEREMY ALBRIGHT

SENIOR EDITOR GORDON MAH UNG REPLIES: You're technically correct, but the material is commonly referred to as "wire loom," "split loom," "split loom flexible tubing," or "split convoluted wire loom." Moral of the story? There is none. Carry on.

SHORT AND SWEET—NOW *THAT'S* MINIMUM BS!

What is "Minimum BS"?

—ANDERSON COSTA

EDITOR-IN-CHIEF JON PHILLIPS REPLIES: Our tagline is intentionally vague—it's meant to evoke an emotional response rather than serve as a precise mission statement for the magazine. My interpretation of the tagline? I believe it's a promise to readers that we will never be beholden to advertising interests, nor we will we offer a bland, corporate product in the style of our direct magazine competitors. But to hell with my opinion, what do some of the other editors think?

TECHNICAL EDITOR WILL SMITH REPLIES: It means crappy products get brutal reviews

FEATURES EDITOR LOGAN DECKER REPLIES: I'm not sure what Minimum BS is, but I know it when I see it... And when I see it, I kick it over into Will's area.

DISC EDITOR BILL MCCLENDON REPLIES: I think the phrase means we'll be providing all the honesty possible within the realms of good taste.

SENIOR EDITOR GORDON MAH UNG REPLIES: I think minimum BS means not a complete *absence* of BS, but rather just a very small portion of it.

EXPLAIN YOURSELF, DECKER!

Logan Decker seems to like the TDK veloCD 24/10/40 (October 2001), but I can't imagine why he'd give a 9 verdict to a product with so many flaws. I've always been under the impression that a product would receive a 10 if there were zero flaws, and go down from there.

In the "What We Hate" column of the review, Decker states that the RAW copying is too slow (20 hours?) and the engineers still need to work on audio extraction problems. Well, to me, any drive that takes 20 hours to copy anything in any mode is a very faulty product.

Decker even states that TDK admits to using different drive manufacturers since the 16x. That alone should put up some type of warning flag. Does Decker plan on doing another review when TDK updates the firmware? I just wish the reviewers of your magazine would honestly look at the way they review things and give these manufac-

LETTERS POLICY: *MAXIMUM PC* invites your thoughts and comments. Send them to **input@maximumpc.com**. Please include your full name, town, and telephone number. Letters may be edited for space and clarity. Due to the vast amount of e-mail we receive, we cannot personally respond to each letter.

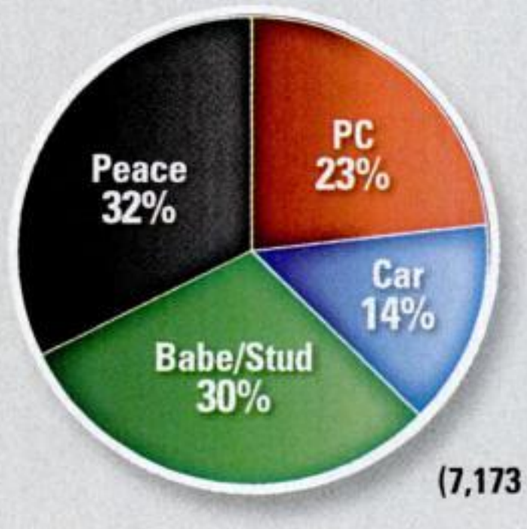
MAXIMUM PC's

READER PULSE POLLS

Your vote counts!

Please contribute to our reader polls at ww.maximumpc.com.

If I had my druthers I'd choose: a) the ultimate PC, b) the ultimate supercar, c) the ultimate babe or stud, or d) peace and happiness for Earth...



(7,173 votes total)

The interesting thing about this poll is that it was created on August 28, and as late as September 10, "peace and happiness" was trailing the pack, firmly lodged in third place. The numbers started changing dramatically on September 11.

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turers a real kick in the pants and show them what "maximum" means. Considering what was written, I would have given the drive a 7 or maybe an 8.

—DOUG HEIMANN

LOGAN DECKER RESPONDS: So many flaws? We think the TDK 24x is an awesome drive. Great performance, great software, and the best documentation in the business. In fact, the drive took up residence in several staff members' test beds before being reclaimed by yours truly.

The audio extraction problem, as stated in last month's Watchdog, has been endemic to all the high-speed drives we've reviewed lately, with the exception of the Plextor 24x (see our review on page 78 of this issue). Commercial stampers were simply not designed to meet the quality standards necessary for ultra-high-speed ripping. We only knocked TDK for not ratcheting down the speed rather than giving up altogether.

We don't have any problem with companies switching drive manufacturers. How the drive performs in our benchmarks is all that matters. And as stated in the review, we won't be giving the TDK another full review on the basis of future firmware. But if RAW mode copying is your bag (now *there's* a warning flag for you), I'd say the TDK rates more along the lines of a 3, at best. We know that a lot of people won't buy a drive without this capability, and that's something we take into consideration. But by no means will it be a make-or-break factor in our reviews.

All in all, Doug, we agree with your sentiments. In fact, it kind of excites us when our readers want us to be harsher. We've discussed at length the possibility of raising the bar for evaluating optical drives, and we'll be paying a lot more attention to performance anomalies in the future. Additionally, we have already begun re-testing some of this year's drives against new benchmarks, and beginning in December, every optical drive review will include comparative statistics for your shopping enjoyment. ■

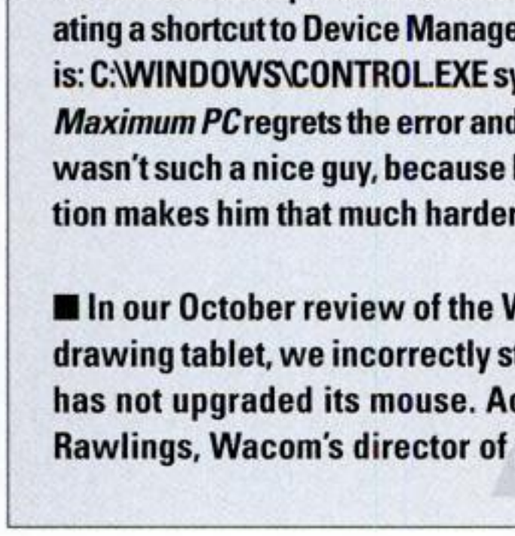
CUT, COPY, PASTE

■ In the October "Windows Tips For Morons" column, Dick Matthews provided the wrong path for creating a shortcut to Device Manager. The correct path is: C:\WINDOWS\CONTROL.EXE sysdm.cpl,system,1. *Maximum PC* regrets the error and wishes Sick Dick wasn't such a nice guy, because his sunny disposition makes him that much harder to fire.

■ In our October review of the Wacom Graphire2 drawing tablet, we incorrectly stated that Wacom has not upgraded its mouse. According to Scott Rawlings, Wacom's director of product management: "Graphire2 comes with a completely redesigned mouse compared with our original Graphire product. The new mouse has a much improved design and feel. It is heftier and of much higher quality. The new mouse also works in boot and Safe Mode and is therefore a complete mouse replacement (not true of the previous Graphire)." *Maximum PC* regrets the oversight.

■ In our Dream Machine feature (September 2001), we provided an incorrect URL for the Keytronic keyboard. The correct URL is **www.keytronic.com**.

Is now the right time or wrong time to develop, market, or play games with anti-terrorism themes? Or are such games never appropriate?



(1,101 votes total)

This poll was created on September 19. Site visitor P. Merritt commented: "Games and movies are meant to be fictional. What would a game like Metal Gear *be without the terrorism? Is it appropriate to release it right now? I say, yes. It would give Americans a way to vent their anger without actually hurting anyone."*

Would you give up some of your online privacy rights to help the world fight terrorism?

(1,089 votes total)

This poll was created on September 23. Tell us, dear readers, do you think the online privacy debate should be covered in greater depth in our magazine, or should we just stick to basic product coverage? Send your opinion to input@maximumpc.com.

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Quick Start

The beginning of the magazine, where articles are small

I'm Too Sexy for My PDA

Geek-chic for PC gadget freaks

Sanyo's Sudbury coat

Sanyo's Montague coat

Scott eVest▶

www.scottevest.com, 866.909.8378, $160

Wireless phone. PDA. MP3 player. Digital camera. GPS unit. Folding keyboard. If you're out of room and you haven't yet stashed away your wallet and keys, you should peep out the Scott eVest. Outfitted with 15 pockets, the eVest is a piece of "technology-enabled clothing" designed to accommodate the burgeoning number of electronic devices inhabiting our lives. The garment even comes with pockets and channels designed to run earphone cables, a wireless phone mic, and PDA power packs. The manufacturer describes a fully wired eVest as a "personal area network." Stick a fork in us, we're now fully geeked.

◀Sanyo Shokai

www.sanyofashionhouse.com, 800.997.2696, Montague, $350; Sudbury, $395

If a tactical vest isn't in keeping with your personal style, perhaps the Sanyo New York line will better suit your aesthetic sensibilities. Available for both women and men, the coats are elegant yet roomy enough to store all your brushed-aluminum tech toys. On the near left, we have the Montague, a mid-length coat sporting Sanyo's "multi-function pocket system," including separate slots for your airline tickets, passport, gloves, sunglasses, wallet, and phone, as well as a special antistatic pocket designed specifically for Palm PDAs. Bonus feature: Each pocket is marked with a pictograph indicating what it's intended to hold! The Montague's short length favors casual dress. The knee-length Sudbury coat (far left), meanwhile, is all business. It features the same multi-function pocket system, but its outer material is dipped in a rain-repellent chemical called polytetrafluoroethylene, and it comes with a liner. Très twee!

Sanyo's cell phone and PDA pockets

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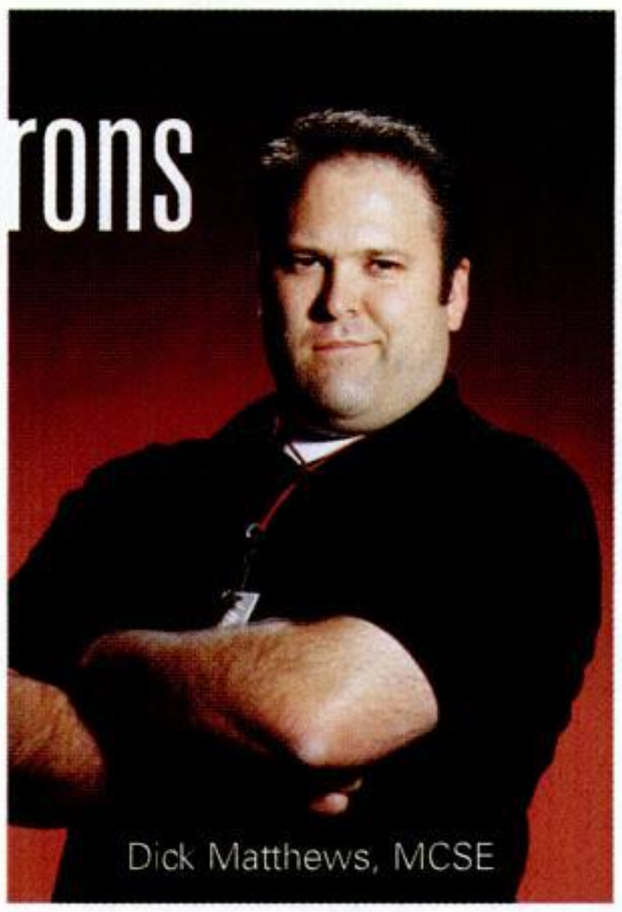
Windows Tips for Morons

A Gorilla in the *Myst*


Dick Matthews, MCSE

Before I excrete another glistening PC tip for you ungrateful morons, I have to get this off my chest: I played the original *Myst* for four hours last night—in my underwear.

Loved every minute of it, and I trust you would have too. Every night's a party at Chez Dick.

OK, here's one for the criminally anal: If you're tired of Windows assuming your name is "OEMUser" or "Customer" (these names often appear as defaults when you, say, register new software), then all you need to do in Windows 2000 is fire up Regedit from the Run menu and change some lines of text. Once you're in the Registry Editor, browse over to **HKEY_LOCAL_MACHINE\SOFTWARE\Microsoft\WindowsNT\CurrentVersion\.** Now change the "RegisteredOwner" key to something more suitable, such as "Little Lord Numbnuts." Hell, while you're in there, you might as well change the "RegisteredOrganization" key to something equally fitting, like "International Dookie-Wipe Machines." If you fall in the despicable ilk of Win95/98/ME users, look in **HKEY_ LOCAL_MACHINE\SOFTWARE\Microsoft\Windows\CurrentVersion** for the same two keys. It's so simple, even a baby could do it.

A-coochie-coochie-coo!

This month's "bonus tip" is for Win2000 and WinXP users only. I love NTFS. I mean, if it were a chick, I'd marry it. But when you have any kind of hard-drive failure in an NTFS drive, you're totally screwed, unless you're prepared for such a disaster. An emergency repair disk (ERD) saves all sorts of info about your disk partitions and the OS configuration, which could allow you to salvage some of your valuable data from the busted drive. Every WinNT/2000/XP user should make an ERD for each system he owns. It's that simple.

If you decide to follow Uncle Dickie's ERD advice, just go to Start, Programs, Accessories, System Tools, then mash Backup, and hit either the Emergency Repair Disk option (in Windows 2000) or the Automated System Recovery Wizard (in WinXP Backup's Advanced mode). If you can't figure out how to proceed from there, then go back to Windows 98, or just go home.

FUN-SIZE NEWS

OpenGL Two-Point-OH!

3DLabs and other vendors are proposing an update to the OpenGL API. OpenGL 2.0 would standardize the programmable shader functions of graphics cards such as nVidia's GeForce3 and ATI's Radeon 8500. Microsoft's DirectX 8.1 lets developers access the shaders by using different extensions for each vendor's pixel shader. Microsoft expects to have a uniform pixel shader API in place by DirectX 9.

Handspring Doubles Memory

Handspring has doubled the base memory of its new Visor Pro unit to 16MB. The Pro uses a 33MHz Motorola Dragonball VZ CPU, lithium ion batteries, and a slightly updated Palm OS. The $300 Visor keeps the Handspring module, but lacks color and the high resolution of models from HandERA and Sony.

Intel's New Deal with Rambus

In a move that's likely to weaken Rambus's legal sway over Intel, the two companies have signed a new five-year contract that supersedes the previous one. Complete details of the deal weren't known at press time, but sources tell us the new contract erases many of Intel's obligations. Under the old contract, for example, Intel was apparently restricted from shipping a DDR chipset for its Pentium 4 until next year.

Maxtor Unrolls 160GB IDE Drive

Maxtor now claims bragging rights to the largest IDE hard drive ever. The 160GB DiamondMax D540X packs 40GB of data per platter and features a 2MB buffer. Although the drive is just 5,400rpm, it does ship with the new ATA/133 interface, which pushes the burst rate of IDE drives up to 133MB/sec.

'Mt. Rainier' to Make CD-RW Packet-Writing Software Obsolete

Number of CD-RW discs owned: **Three**
Time wasted trying to get packet-writing to work: **3 hours**
CD-RW's value as a removable-storage technology: **Almost worthless**

If that's your view of CD-RW, then the upcoming Mt. Rainier spec may finally change your mind. The technology promises to make copying and erasing CD-RW files as easy as using a floppy drive. Backed by Philips, Sony, Microsoft, and Compaq, Mt. Rainier will integrate drag-and-drop capability in future operating systems and hardware. This will eliminate the need to run packet-writing software whenever you want to use CD-RW media as removable storage.

Mt. Rainier won't fix everything overnight. Legacy CD-RW drives will only be able to read Mt. Rainier discs; they won't be able to write to them. Also, using new Mt. Rainier drives in systems with old OSes will require that a special application be run (shades of today's packet-writing situation, eh?).

Support for Mt. Rainier—which was ratified earlier this year—didn't make it into Windows XP, but it's believed Microsoft could add support, just as it plans to do with USB 2.0. Because Mt. Rainier applies only to CD-RW and not the upcoming DVD+RW/-RW formats, it's possible the spec may be too little, too late.

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See your local software retailer, visit www.powerquest.com/partitionmagic, or call 1-888-497-9998 and discover what a good fence can do for your data.

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5 EASY STEPS

Securing Your New PC

1 Turn off file and print sharing: Unless you're sharing files with other machines on a LAN, there's no need to have file and print sharing enabled. Right-click Network Neighborhood, go to Properties, hit File and Print Sharing, and make sure the boxes are unchecked.

2 Remove Windows scripting host: Unless you're using scripts to create macros (and if you're reading this blurb, you probably aren't), then you have no need for this extremely vulnerable feature. Remove it by going to Add/Remove Programs, hitting the Windows Setup tab, selecting Accessories, then hitting the Details button. A list of Components will pop up; uncheck Windows Scripting Host.

3 Immediately install firewall and antivirus software: ZoneAlarm (**www.zonelabs.com**) is a free, reliable software firewall that will keep out hackers. Either Symantec *Norton AntiVirus* or Network Associates *McAfee VirusScan* are probably already installed on your PC; use one of these utilities to keep your machine bug-free (and make sure you always keep your virus-scanning software up-to-date with the latest virus profiles).

4 Use "strong" passwords: Passwords such as Guest, Password, and whatever your name happens to be aren't good. Consider using a phrase such as "I like my computer because it is 8 times faster than yours" to produce a password like "Ilmcbii8tfty."

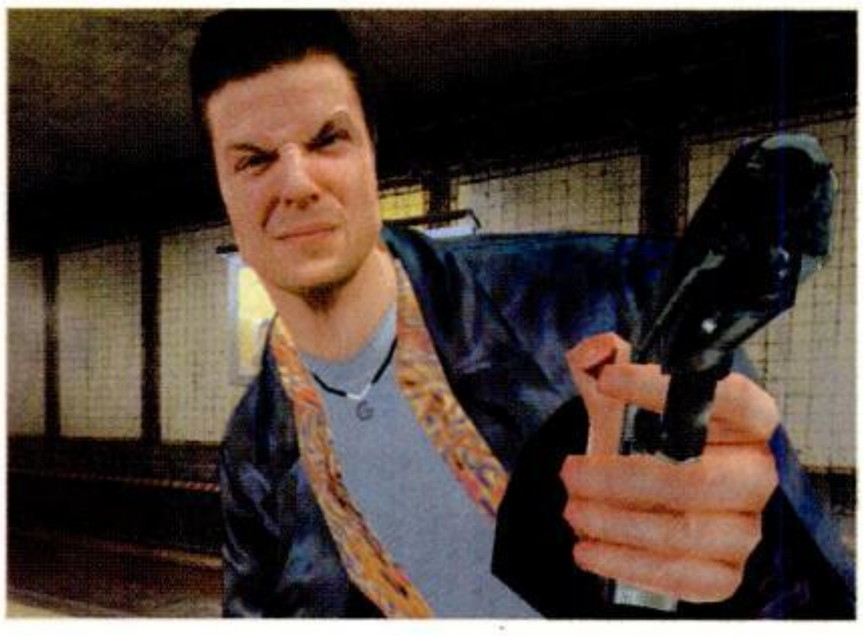
5 Hardware NAT: If you're broadband-enabled, consider a cable/DSL router such as LinkSys's four-port router. By using native address translation (NAT) to route all traffic through a single IP, your individual machines' IPs are kept secure.

Are You a Royal Payne in the Ass?

Win Fame & Fortune in Our Max Payne Look-Alike Contest!

CONTEST

Do you look like Max Payne? Do you know someone who does? What about your sister, wife, or girlfriend? What if she cut her hair and slicked it back in a pompadour? Well, now's the time to act! *Maximum PC* will award a TDK Mojo CD-MP3 player to each of the three winners of our Max Payne Look-Alike Contest (runners-up will receive whatever useless junk we have lying around the office).



All you need to do is e-mail your name, phone number, and your best digital look-alike pics to input@maximumpc.com by no later than October 31, 2001. The three prize categories include: Best Physical Likeness, Best Costuming/Grooming, and Most Creative Image Submission. Don't be shy! Just enter! All winners will get their pics in the magazine, accompanied by embarrassing captions. For more information on Max Payne, go to: **www.maxpayne.com.** For more information on Mojo, go to: **www.tdk.com/mojo/index.html.**

TDK Mojo

GAME THEORY

BY THOMAS L. McDONALD

Escape for a War-Enraged People

■ **As I write this, the ruins of the World Trade Center are still smoldering in the next state, a short hop from where I once lived and went to school. It makes what we do here feel rather trivial. Once shock dissipates, however, people will likely return to entertainment as escape, even though escape is not really what we need right now. It does make me wonder what shape gaming will take in the next year. Hollywood has already pulled a number of movies with graphic violence and terrorism from the pipeline and is planning to produce more wholesome family fare and light comedy, according to a story in *Variety*. As I write this, a press release appears, informing me that the home version of the light-gun game *Crime Patrol* won't be released because of the current situation, and other cancellations may well follow. When faced with a choice between upcoming releases such as the blood-drenched *Return to Castle Wolfenstein* or the benign *Sid Meier's SimGolf*, which do you think a rattled and war-enraged people are going to choose for escape? Either way, the answer may tell us something about our current mindset. Are we engaging, or are we escaping?**

■ ***Conquest: Frontier Wars* is an interesting RTS game that could evolve into an underground favorite much like *Kohan*. It began life at the pre-Microsoft Digital Anvil development house under the aegis of the Roberts brothers and Eric Peterson. Peterson got *Conquest* in the divorce, forming Fever Pitch studios to complete the game. Microsoft dumped the game last year, and Ubi Soft picked it up. This is rather like surviving the Titanic only to be rescued by the Lusitania, since Ubi Soft seems to have some fear that people might actually hear about and want to buy its PC games. *Conquest* adds a couple of twists—such as charismatic fleet admirals and universe hopping—to familiar RTS elements to create a quite enjoyable experience. This was a good year for an RTS genre which seemed to have slumped into tedium, with *Kohan*, *Battle Realms*, and *Conquest* all making mild but important changes to the formula to keep things fresh.**

■ **With the release of the gigantic patch version 1.2.5, the clock finally started on the free month for registered users of *World War II Online*. An RPG-like ranking system, more units, and even a ship have all been added. Now that it works, will people try it again? For that matter, will people want to play a war simulator in the midst of the real thing?**

Tom McDonald has been covering games for countless magazines and newspapers for 11 years. He lives in the New Jersey Pine Barrens.

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RADEON™ 8500

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Head2Head

A showdown among natural competitors

THIS MONTH: OS Gooeys

The most visible part of any OS is its graphical user interface, commonly called the GUI (pronounced goo-ee). Interestingly, both Apple and Microsoft released major new OSes this year, complete with revamped GUIs. Naturally, controversy arose on the net about which GUI was better and who ripped off whom. At *Maximum PC*, we've heard enough of it and have decided to settle it once and for all, Head2Head style. Our (cough) "scientific" approach should answer everyone's GUI questions.

—WILL SMITH

OS X'S AQUA

Control Panel: Dirty, stinkin' Mac users call the Control Panel "System Preferences," and it remains largely unchanged from previous versions of the Mac OS. The latest System Preferences window looks remarkably like previous iterations of the Windows Control Panel, but the latest Windows offering trumps what you see here. **Winner:** Luna

Task Manager: In Applese, the window that details your use of system resources is called the "Process Listing"—and it's a direct result of Apple's new OS being based on the BSD operating system code. Mac users should be grateful they finally have resource reports and the ability to kill errant programs, but Windows users can gloat they've had these features in NT since time immemorial (and our Task Manager is slightly more informative). **Winner:** Luna

Look familiar?: Red is close, yellow is minimize, green is maximize. If you're a Windows user, getting used to the Apple window controls is now easier than ever before. (Of course, if you're a Mac user and you like the "roll-up/roll-down" paradigm, you're now SOL.)

Like a see-thru blouse!: Transparency effects don't make Aqua more useful, but they sure look neat! Too bad they bog down older Macs.

Start Menu: Well, in Apple parlance it's actually called "the Dock"—and while its content is completely user-defined, and it looks cooler than WinXP's Start Menu, it's not as useful as a navigation device. All the icons in the Dock feature cool animations, and active programs are denoted with a triangle, but on current Mac hardware, this artsy-fartsy GUI feature is painfully slow. **Winner:** Tie

Explorer: If you speak the language of the Macintosh masses, you call this window the "Finder"—and my, doesn't it look remarkably similar to Windows Explorer? Call us crazy, but we like the new Apple Finder more than the now dumbed-down Windows Explorer: No matter how far you drill down into a drive folder hierarchy, you can still clearly see—and move to—any part of the drive. **Winner:** Aqua, by a hair!

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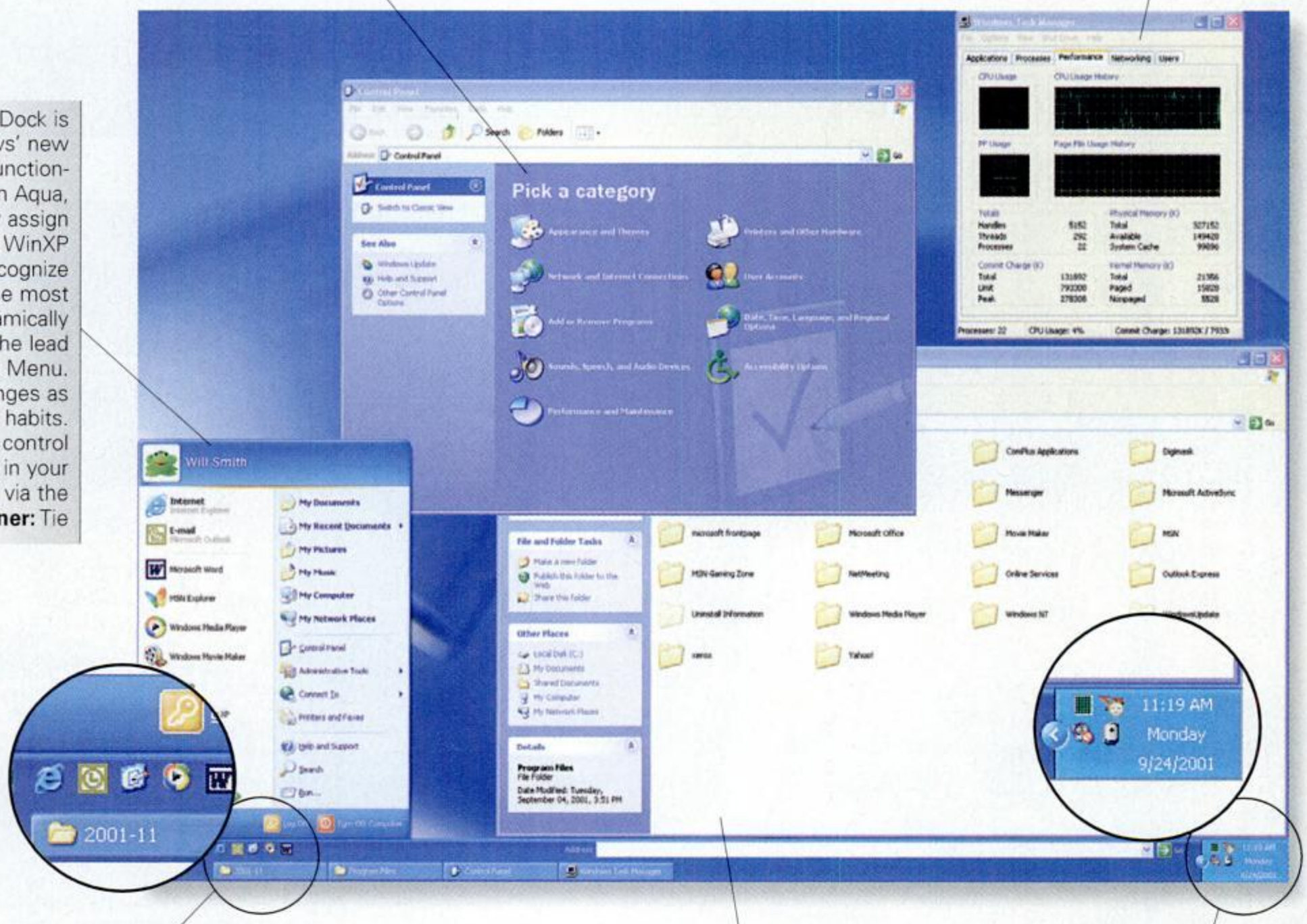
WINDOWS XP'S LUNA

Control Panel: Finally, Microsoft took a motley assortment of unrelated icons and grouped them together in logical hierarchies. And if you don't like the new world order, you can always "Switch to Classic View." **Winner:** Luna

Task Manager: The new Task Manager's Processes tab provides the same familiar list of running apps and their memory usage, but the improved Performance and Networking tabs offer more detailed info about everything ranging from overall memory usage to page file usage to network performance—in either straight text or pretty graphs. **Winner:** Luna

Start Menu: Aqua's Dock is prettier, but Windows' new Start Menu is more functional than ever before. In Aqua, you have to manually assign icons to the Dock, but WinXP is smart enough to recognize which apps you use most frequently, and dynamically assigns these apps the lead positions in the Start Menu. The order even changes as you alter your usages habits. Also, every app, control panel, and document in your PC is now accessible via the new Start Menu. **Winner:** Tie



One-stop shopping: While WinXP doesn't include the fancy-schmancy "Dock," it does include the Quick Start area, where you can place shortcuts that require just one click to open your favorite apps.

Explorer: The new Explorer—despite only showing the contents of one folder at a time—does have a cool, context-savvy interface. For example, if you're exploring a folder full of MP3s, the folder will include controls for playing the files and moving them to a CD-R or portable music player. Nonetheless, the WinXP Explorer is less functional than Aqua's Finder when you simply want to browse your hard drive. **Winner:** Aqua, by a hair!

Out of sight, out of mind: The new iteration of the System Tray doesn't unload obnoxious apps that are placed inside without your permission, but at least it *hides* the ones you never use.

THE UPSHOT

As you can see here, WinXP's Luna interface is clearly superior to anything the Jobsian crowd in Cupertino has to offer. We have to give aesthetic props to Apple for the swanky wrap-away effect used when documents are maximized and all the coolness that is the Dock, but ultimately, the new Luna interface is much more usable than Aqua. Did Luna rip off Aqua? We don't know, and we don't care. We'll just sit back and enjoy the benefits of a modern GUI. ■

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WatchDog

Maximum PC takes a bite out of bad gear

Got a bone to pick with a vendor? Been spiked by a fly-by-night operation? Sic The Dog on them by writing **watchdog@maximumpc.com**. The Dog promises to get to as many letters as possible, but only has four paws to work with.

Compaq says it's "committed" to its existing customers and will honor warranty and service for machines such as this Presario 7000.

Beware of Big Brother

If you haven't heard about the proposed Security Systems Standards and Certification Act (SSSCA), listen up. It could be the worst piece of legislation since Congress passed the Digital Millennium Copyright Act in 1998. The SSSCA would make it "unlawful to manufacture, import, offer to the public, provide, or otherwise traffic in any interactive digital device that does not include or utilize certified security technologies that adhere to the security systems standards...." In other words, the SSSCA would make it illegal to sell or possess an MP3 player that doesn't use content protection. Any person who removes copy protection from a game, movie, or song and makes it available to the public could face stiff fines and jail time. The bill is also so overly broad, it will likely implant content-protection schemes in all future PCs and peripherals. Want to burn a mix of your favorite music using CDs that you own already? The SSSCA would certainly end that practice.

The good news is that the SSSCA hasn't been submitted to the Senate yet. According to the office of Senator Ernest Hollings (D-S.C.), the senator will be the main sponsor of the bill. If you oppose such a law, contact Senator Hollings at www .senate.gov/~hollings/offices.html. To read the working draft of the bill, visit http://cryptome .org/sssca.htm.

Call it a Presilion

DEAR DOG: I'm concerned about the merger between Compaq and Hewlett-Packard. I own a Compaq PC with about two years left on the extended warranty. Do you think my warranty will be honored?

—SAM

THE DOG RESPONDS: Sam isn't the only person concerned that a Hewlett-Packard/Compaq merger could leave thousands without the support they paid for. The Dog contacted both companies for their respective statements on post-merger support. "It is business as usual," Compaq spokesman Steve Sievert told The Dog. "All customer commitments made by Compaq, including contracts, products, and service warranties, will be honored according to their terms, both prior and subsequent to the completion of the announced merger with Hewlett-Packard. Someone should not be apprehensive about buying a Compaq computer right now because of warranty and service concerns."

Hewlett-Packard officials offered similar assurances that the company fully intends to support warranties and services on machines sold before and after any merger.

While Compaq and HP are expected to do their best to keep customers happy, in all likelihood, certain technologies and product lines will be eliminated. Compaq is a proponent of DVD-R, while HP is a major player in the adoption of DVD+RW. What might happen to people who've bought Compaq machines with DVD-R?

"All customer commitments made by Compaq...will be honored."

The answer simply isn't known yet, though our guess is that the standard supported by HP—DVD+RW—will prevail, and DVD-R support will be much harder to come by than if Compaq remained autonomous.

Fortunately, both companies' lines of enthusiast PCs tend to use nonproprietary components that grant consumers the ability to upgrade and replace parts as necessary. The merger itself will take many, many months to execute, and any PCs purchased from HP or Compaq will be covered for at least the period of the standard warranty. Still, before The Dog can feel completely comfortable about future purchases, both companies need to come clean about which technologies will survive, and to what extent technical support will be available for castaway parts.

Buy.com Busted

DEAR DOG: I was notified on November 1, 2000, that I was a member of a class-action lawsuit against Buy.com. The suit involves a Hitachi Superscan 753 that Buy.com listed for $164.50 (the monitor normally costs about $550), but then neglected to fill all orders. Despite my numerous attempts to get an update on the lawsuit, all parties involved say they "can't comment on an ongoing legal case." That's crazy! All I want is a status update, not immediate reparations! I sent e-mails and made phone calls, to no avail. C'mon, Dog, throw me a bone.

—ROBERT WHITEHEAD

THE DOG RESPONDS: The Dog did a little digging and found that Robert and about 6,800 people will receive roughly $50 from Buy.com for the pricing glitch that occurred on Buy.com's web site in 1999. Buy.com sold the monitors it had in stock for the price published in error, then canceled the remaining orders. People who did not receive the monitors filed suit alleging that Buy.com's listing of the monitor for $400 less than normal was a "bait and switch" tactic. Buy.com settled the case for $575,000 in October 2000. Lawyers in the case took a $190,000 bite out of the settlement, court costs took another chunk, and consumers got the rest.

Sun Sets on Suncom

DEAR DOG: I have a Suncom SFS Flightstick and Throttle combo for which I paid more than $100. It worked fine under Windows 98 and ME. It's advertised as working under Windows 2000, but I can't get it to install under 2000. I have tried for more than a week to connect to Suncom's web site with no luck. Has the company gone under? I would hate to have such a good piece of equipment relegated to the spare parts pile, but I don't want to have to go back to 98 just to play one or two games.

—JEFF RIDPATH

THE DOG RESPONDS: According to ex-employees of the company and an employee at Suncom's

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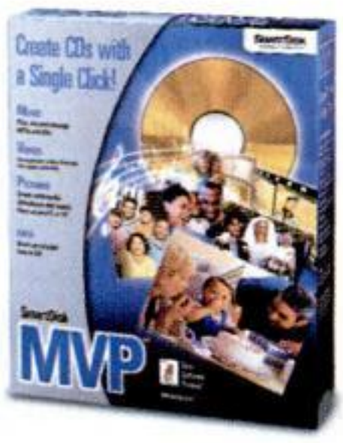

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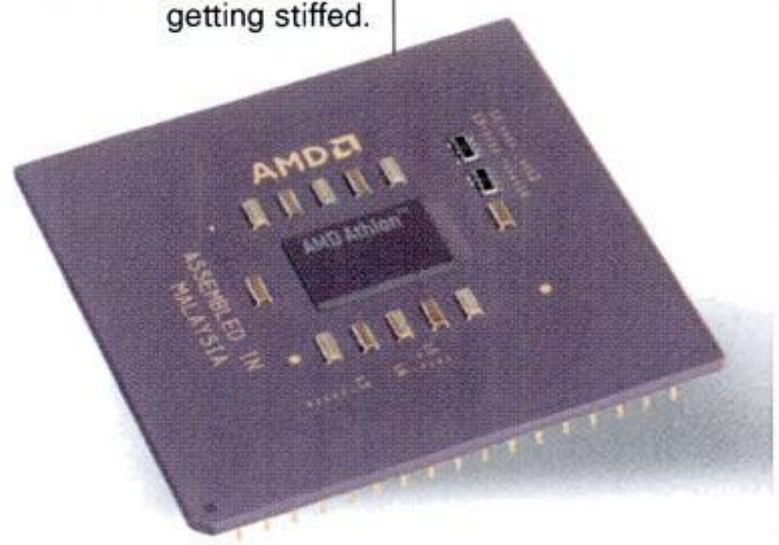
Consumer Advocate

sister company, Suncom was shut down on May 1, 2001. The assets—not the liabilities—of Suncom were sold off to Thomson Consumer Products. This means that Suncom's game controllers are slated for the junk pile unless you can locate drivers. Two sites you should check out are WinDrivers.com and DriverGuide.com. Both seem to stock an assortment of drivers for dead devices. If you can't find drivers for your Suncom there, ask other users of the web sites for assistance in locating them.



Tough luck: Instead of a nice, warm Thunderbird and motherboard, reader Kelly Feragen ended up getting stiffed.

Altima Offline

DEAR DOG: I recently attempted to purchase a motherboard and Athlon combo from Altima2000.com. Altima doesn't take credit cards but does use PayPal. I used PayPal to order about $455 of hardware from Altima. After the PayPal transaction, I received a message from Altima that my goods would not be coming. I have since used every avenue available to get my money returned, to no avail. When I contacted PayPal, it acknowledged my dispute, but since Altima's PayPal account had been emptied, there was no money to return to me. I hope *Maximum PC* can warn consumers that PayPal is certainly not a secure way to do business and is in fact undesirable, as you don't have any options for recovery that a direct transaction would offer.

—KELLY FERAGEN

"After the PayPal transaction, I received a message from Altima that my goods would not be coming."

THE DOG RESPONDS: By the time The Dog received Kelly's complaint, Altima had changed the facade of its online store to include a brief message to its customers: "On behalf of Altima Solutions' old management team, we would like to extend our appreciation and gratitude to every one of our 25,000 customers and to our 150 vendors. As you must have learned by now through our past correspondence, our company was acquired in July of this year."

The site directs customers to contact the manufacturer of the product for assistance. Although the site says Altima was sold, there's no information about who purchased it. Of course, Kelly isn't the only person to complain about Altima2000.com. The Better Business Bureau of Southern California gave Altima an unsatisfactory rating, saying complaints ranged from defective or incomplete orders to poor service. "Most of the complaints are unanswered," the Bureau file states. Consumers at Resellerratings.com also had problems with Altima. Several reported defective products out of the box, an inability to reach Altima, and months-long struggles with the company to receive refund checks.

Unable to reach owners of the company directly, The Dog exchanged e-mail with the former president of the company, Tarek Ayoub, who says Altima was sold in July, and that during the final stages of escrow, some customers' orders got lost in the shuffle.

"It is my understanding that all the open issues were resolved. However, there's a handful of people that were not satisfied with the way their issues were handled—even after receiving either an order cancellation and a full refund, or eventual delivery of their open order, and after receiving a full apology from the company and a detailed explanation of the acquisition process that caused this gap in order processing," Tarek Ayoub writes. Ayoub says all customers were and are directed to contact Altima Holding Corp. at 27475 Ynez Road, Temecula, Calif. 92591. Ayoub did not provide a phone number for the new owner, and The Dog was unable to reach the new company before press time.

Kelly's point on PayPal.com is also well taken. PayPal.com does not offer very much protection from fraud. The company offered fraud insurance for two months last year, but discontinued that service after people began abusing it, says company spokesman Vincent Sollitto. An overwhelming majority of the 200,000 daily PayPal transactions go through without a hitch, Sollitto says. PayPal does give you some recourse, however. If you use a credit card to make your PayPal payment, you can still ask your credit card company to reverse the charges. Reversing charges will stick PayPal with the cost. Be warned, however: PayPal says it may cancel a consumer's account if it gets stuck with the bill. This may make good business sense for PayPal, but it isn't a good way to build customer loyalty.

There's probably two lessons here. The first is to make sure you use a reliable credit card to insulate yourself from fraud when buying online with PayPal, or with any transaction, for that matter. The second lesson is to be wary of web sites that cannot directly accept credit cards. This indicates the site may be too small to have a merchant account and thus too small to reliably conduct business. ■

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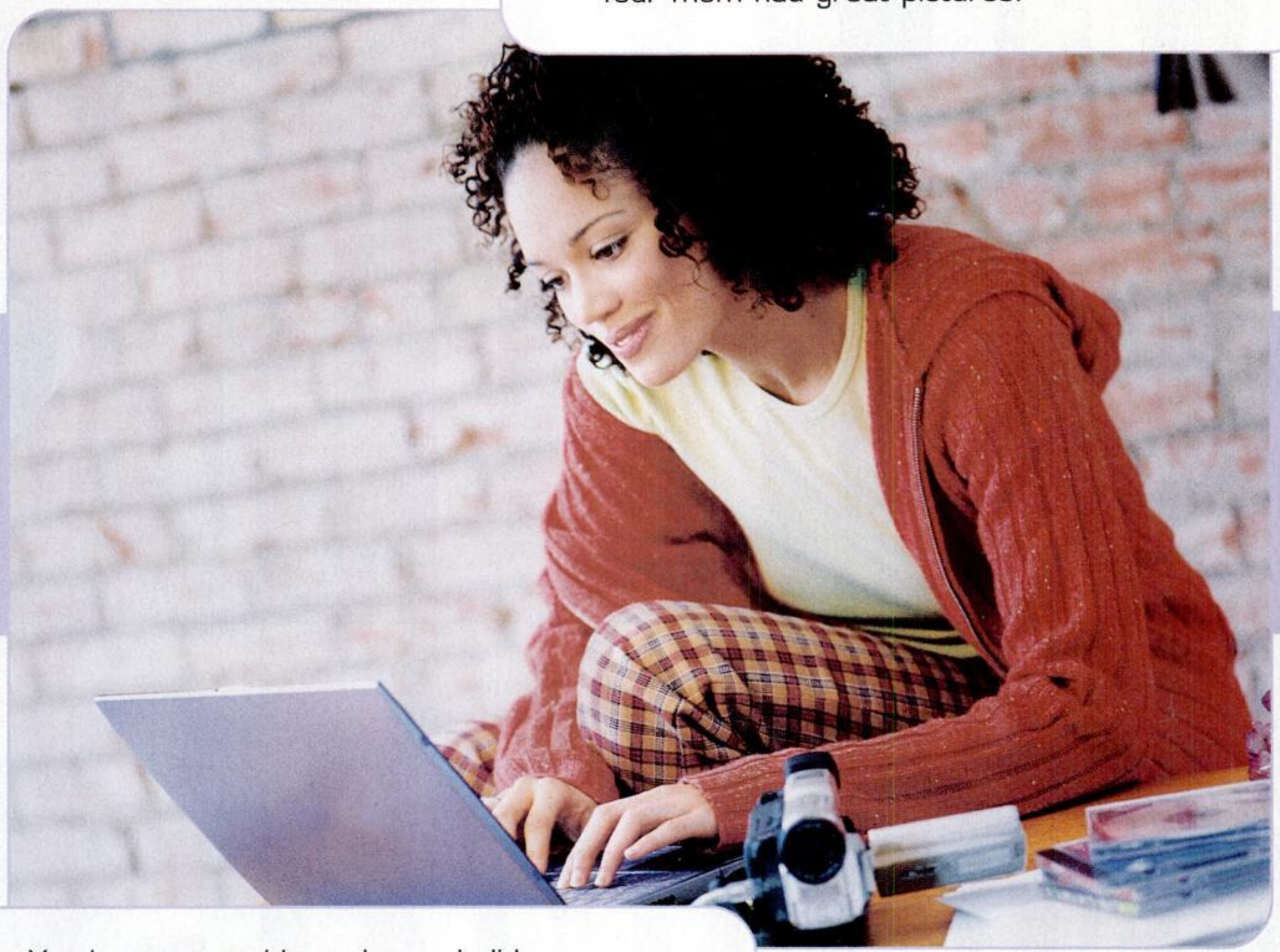
Your mom had great pictures.



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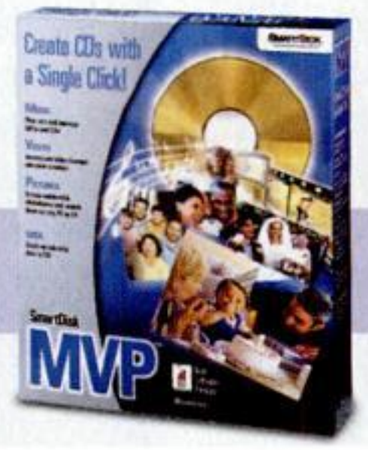

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MUST-HAVE HARDWARE

CONSUMER ADVISORY:
Unless otherwise noted, all the products featured in this article should be available by the time this magazine hits newsstands.

YOU CAN CALL IT A HARMONIC HARDWARE CONVERGENCE:

The stars have aligned in the PC heavens, and suddenly all the hot gear we've been dying to get our hands on is barreling down the pike. The latest videocards, the fastest CPUs, the most intriguing pieces of schwag in every imaginable category—it's arriving en masse. So here's the scoop on the most anticipated gear of the 21st century, the parts and peripherals that make you drool at the mouth and scream,

"I JUST GOTTA HAVE IT!"

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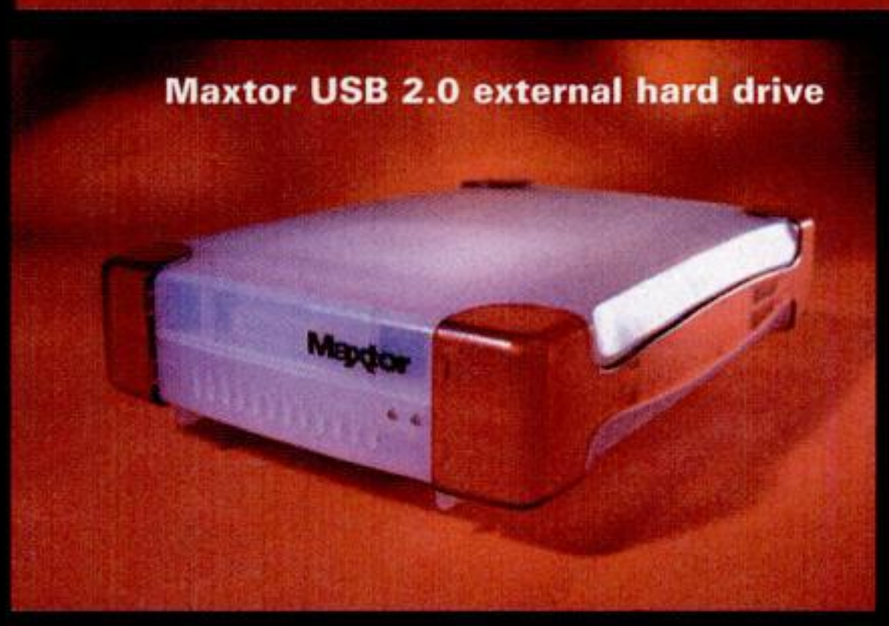
USB 2.0: MO' BETTER BANDWIDTH

Developed by Intel to make it easier to jack peripherals into your PC, the USB standard has been embraced by virtually the entire PC industry. Now mice, keyboards, gamepads, digital cameras, MP3 players, and sundry other digital devices are USB-ready. USB is the connection standard for all but the most bandwidth-hungry peripherals—and all despite an awkward adolescence marred by slow adoption and incomplete support in Windows.

Maxtor USB 2.0 external hard drive



But the first generation of USB, currently revved to USB 1.1, delivers just 12Mbps of data—that's equivalent to 1.5MB/sec at full tilt. Now that's just fine for low-bandwidth devices like keyboards and mice, but scanners and external storage drives are another matter. Want to transfer a file that's bigger than 1MB? Well, you'll have to wait.

Enter USB 2.0. Compared with the water-weenie squirt of bandwidth available from USB 1.1, USB 2.0 delivers an Alaskan Pipeline that tops out at 480Mbps—that's 60MB/sec! Just for kicks, we recorded the time it took to transfer a 100MB WAV file from our Windows ME zero-point test system to a **Maxtor USB 2.0 External** hard drive ($200 for 40GB, **www.maxtor.com**). With the external drive connected to a USB 1.1 port, the transfer took 108 seconds. With USB 2.0, it took eight seconds. That's a zesty 1,250 percent improvement!

Rollout of USB 2.0 products should get a significant boost from the launch of Windows XP. Microsoft chose *not* to include USB 2.0 drivers with shipping versions of the new OS, but will have drivers ready to download from the Windows Update site on the first day WinXP is released. Several manufacturers have announced or shipped add-in USB 2.0 PCI cards, including IOGEAR ($60 for a **5-port USB 2.0 PCI card**) and Orange Micro ($130 for an **OrangeLink+**, a fancy USB 2.0/FireWire combo board). You can get more information from **www.iogear.com** and **www.orangemicro.com**. Motherboard makers have already started showing new models with USB 2.0 built in. Those should start hitting retail by the end of 2001 or the first part of 2002.

5.24 MEGAPIXEL CAMERAS—SAY CHEESE!

Despite a glut of multi-megapixel cameras and photo printers that threaten to turn amateur shutterbugs into beret-wearing *artistes* overnight, consumer-level digital photography hasn't yet exceeded the image quality of 35mm film. New 5.24-megapixel cameras, however, bring the promise of true-as-film digital photography to the very threshold of fulfillment. Using a 2/3-inch CCD sensor, high-end digital cameras from Minolta (**www.minolta.com**) and Sony (**www.sony.com**) can produce 260dpi resolution on 8x10 prints. That's just shy of the 300dpi Holy Grail of digital photography: a digital image that's indistinguishable from a film print of the same size.

Minolta and Sony aren't the first manufacturers to the 5-megapixel party. Nikon's D1H and D1X digital SLR cameras crossed that high-resolution landmark last spring. But with street prices of $4,500, Nikon's megapixel heavyweights are still meant for pros. By contrast, the new **Minolta Dimage 7** retails for $1,500, and Sony prices the **Cybershot DSC-F707** at an amazing $1,000, which puts it in the same price range as many high-end 4-megapixel cameras.

The biggest difference between the Sony and Minolta cameras is in their optics. The Minolta Dimage 7 comes with a 7x optical zoom lens (equivalent to a 28mm–200mm zoom on 35mm film cameras) and a maximum aperture of f2.8. The Sony has a 5x optical zoom lens (38mm–190mm equivalent) with a maximum aperture of f2.0. Both come with advanced auto-exposure options and, of course, slots for common removable media. The Cybershot DSC-F707 uses Sony's Memory Stick, and the Dimage 7 uses either CompactFlash or an IBM Microdrive.

Camera makers have fine-tuned their lenses for use with CCD sensors, totally eliminating the shadowy edges on images that occurred in the first generations of digital cameras. With 5-megapixel cameras now available, Gauloises-smoking digital photographers might soon be able to eschew film altogether, with no compromise in image quality or artistic principles.

MUST HAVE HARDWARE

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MUST HAVE HARDWARE

3D ACCELERATORS FROM ATI, NVIDIA, & MATROX

New videocards are always the most anticipated products in any harmonic hardware convergence, and this November, the few remaining 3D chipset manufacturers didn't let us down—well, at least not with respect to timeliness. As usual, the latest 3D chipsets aren't always the *best* 3D chipsets. Nonetheless, any 3D-related news is good news, so let's jump in head-first...

ATI'S CHRISTMAS PARTY

ATI (**www.ati.com**) is getting into the holiday spirit with a stocking full of new releases, ranging from mobile products to a whole new chip design complete with fully programmable pixel and vertex shaders. The **Radeon 8500** ($400), which is based on the R200 chip, is the successor to last year's Radeon DDR. This time around, the 8500 sports (drum roll, please)... fully programmable vertex and pixel shaders, much like the GeForce3! Unfortunately, the Radeon 8500 doesn't support the same version of the programmable pixel shader spec that the GeForce3 family does, so game developers who want to support both boards will have to write two different pixel shaders for each pixel effect they produce.

ATI's Radeon 8500

The Radeon 8500's core runs at 250MHz, and its 64MB of DDR memory runs at 275MHz. Of course, with a programmable architecture, speed isn't as important as features, and the Radeon 8500's pixel shaders look to be more impressive than the GeForce3's. While the vertex shaders are essentially identical, the Radeon 8500's pixel shaders are capable of performing 22 jaw-dropping operations per pixel drawn on the screen; the GeForce3's are capable of just 12 operations. We give the Radeon 8500 a thorough rogering on page 76.

Another debut from ATI is the desktop **Radeon 7500** ($200), a hopped up version of the original Radeon, with a 270MHz core and a 230MHz DDR memory clock. This new board should perform around the same level as a GeForce2 Ultra, but does *not* include any programmable shaders (the original Radeon received a 9 verdict and a Kick Ass award in our October 2000 issue).

ATI's new **Mobility Radeon 7500** could be the fastest graphics chipset for notebook computers. In its fastest configuration, it offers up to 64MB of 128-bit DDR memory and full 4x AGP support. Amazingly, ATI promises that the Mobility Radeon 7500 will clock its engine at 270MHz—almost double the speed of a stock GeForce2Go. On nearly identical 1.13GHz notebooks—one equipped with a GeForce2Go and one equipped with the fastest Mobility Radeon 7500—the ATI part was easily twice as fast as the nVidia part in most of our benchmarks. The Mobility Radeon 7500 isn't all about speed; it's also about power saving. When there's no need for the graphics engine to operate at 270MHz, it cranks down to 66MHz. In addition, the Radeon 7500 can shut down up to 30 different sections of its graphics chip when not in use. ATI says notebooks using the new chipset are expected to be on sale before this Christmas.

THE GEFORCE3 FAMILY: HOME FOR THE HOLIDAYS

Of course, it wouldn't feel like a holiday without another product announcement from nVidia (**www.nvidia.com**). Our sources tell us the new flagship from the graphics giant will be called the **GeForce3Ti 500**. Ti is the chemical symbol for titanium. What does titanium have to do with 3D graphics? We have no idea. Regardless, we can tell you the new board will sport a 240MHz core speed and 64MB of 250MHz DDR SDRAM. In fact, it appears the new flagship accelerator is nothing more significant than a faster version of its predecessor, the original GeForce3, which ran at a 200MHz core with 230MHz memory.

We haven't yet seen a final board, but we anticipate that the new Ti 500 won't be much faster than the original GeForce3 in traditional rendering environments, though it will be much faster in games that use the programmable shaders. GeForce3Ti 500 boards should be priced around $400. Board manufacturers hadn't yet been announced at press time. On the value front, you can expect a clocked-down version of the GeForce3, dubbed the **Ti 200**, for sale at $330. The Ti 200 will run with only a 175MHz core and 200MHz DDR SDRAM.

MATROX'S G550: GRAPHICS ACCELERATOR OR PUPPET THEATER?

In the "we-didn't-know-anybody-needed-this" category, Matrox (**www.matrox.com**) is introducing the **Millennium G550** for $125. The card is run-of-the-mill Matrox fare (read: boring), but includes a programmable vertex shader in support of a new "headcasting" engine. In case you've been out of the Matrox loop, headcasting is just like videoconferencing, but instead of sending and receiving low frame rate, low-quality video of real-life talking heads, it sends and receives *3D models* of talking heads, which lip-sync in time with your conversation. Yes, the G550's vertex shader was specifically designed to accelerate this bizarre custom. Check page 80 for the full review.

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FREQUENCY-BUSTING PROCS FROM INTEL AND AMD!

Now nine months after the release of its controversial flagship processor, Intel (**www.intel.com**) has released a lofty **2GHz Pentium 4**. Even better, Intel has also demonstrated a super-cooled Pentium 4 running at—are you ready for this?—*3.5GHz*. Over its lifespan, the P4 is expected to reach *10GHz*. Pull down the blinds and send the kids next door; we're gonna have ourselves a CPU-love party.

So how did Intel out-clock the aggressive AMD in such a short period of time? Much of it can be attributed to the P4's "hyperpipelining," a technique that allows CPUs to reach speeds that seemingly defy process technology constraints (see Tom Halfhill's report on page 48). In its 2GHz incarnation, the P4 isn't much different from its 1.9GHz and 1.8GHz siblings. Available in both the obsolete Socket 423 package and in the new Socket 478 package, the latest P4 features the same 256KB of full-speed L2, trace-cache, and SSE2 instructions of all other P4s. While the 2GHz P4 rocks the competition, the real heat might come in late November when Intel is expected to show off 2.2GHz P4s using the new "Northwood" core. Northwood introduces copper interconnects and a 0.13-micron process technology to the P4 hyperpipelining party; expect shipping procs in early 2002.

For now—and at least until AMD releases its next-gen CPU—the 2GHz P4 is the speed king. In our CPU-dependent *MusicMatch* benchmark, a 2GHz P4 teamed with a single IBM Deskstar and GeForce3 took about 206 seconds to create a single MP3 at high quality from a 58.3MB WAV file—that's about 27 percent faster than most 1.4GHz Athlon T-bird systems. In *SYSmark2001*, the 2GHz P4 system pulled down a very respectable 168. All *SYSmark2001* scores are an average of Content Creation and Office Productivity scores, and for the record, the two-giggy hit 182 and 155, respectively. While the cumulative 168 score is impressive, it's really on par with the fastest Athlon T-bird systems, which tend to be faster in Office Productivity than in Content Creation.

In our *Adobe Premiere 6.0* benchmark, the 2GHz P4 was about 10 percent faster than a 1.7GHz P4, but just a hair faster than a 1.4GHz Athlon T-bird machine we benchmarked in August. However, the P4's latest gaming scores were extremely impressive, especially when paired with nVidia's Detonator XP drivers. In our Maximum PC *Quake III* demo, we recorded an astounding 76.8fps. Similarly, the P4 and Detonator XP drivers gave us 22.7fps in Game 4 of *3DMark2001*. You can credit much of this record-breaking performance to the new drivers—after all, September's Dream Machine gaming rig running a GeForce3 and a 1.8GHz P4 clocked to 2GHz, hit just 69.6fps and 18.9fps in *Quake III* and *3DMark2001* Game 4, respectively. The real showdown will come when we get our hands on an **Athlon XP** for a true head-to-head comparison.

Yes, AMD's update to the Thunderbird Athlon will be called Athlon XP (think "eXtra Performance"). Previously code-named "Palomino," the new Athlon desktop CPU offers several improvements over the Thunderbird. For starters, a 20 percent power consumption reduction (care of tweaks to the fabrication process and on-chip signal paths) will keep the chip cooler as AMD (**www.amd.com**) pushes up clock speeds. Like the Athlon 4 for notebooks and the Athlon MP for workstations, Athlon XP will also contain a data pre-fetch unit that will let the cache intelligently grab data it thinks the CPU core will immediately need to process. What's more, an improved 3DNow! instruction set adds 52 new instructions that essentially let the Athlon XP take advantage of programs and games that use Intel's SSE instructions.

AMD's Athlon XP

The Athlon XP will debut at 1.53GHz, 1.47GHz, 1.4GHz, and 1.33GHz, using AMD's current 0.18-micron process, but won't feature an enhanced pipeline or other techniques that would let it scale to the ultra-high clock speeds of the P4. While we couldn't get our hands on an Athlon XP in time for testing, if it follows the track of the Athlon MP, the new AMD CPU is likely to be faster than a 2GHz Pentium 4 in a number of applications. Unfortunately, AMD has chosen to follow a Cyrix-like formula to account for its megahertz gap with Intel. The top 1.53GHz Athlon XP will be sold as the "Athlon XP Model 1800+" to suggest to consumers that its just as fast as the 1.8GHz P4. The 1.47GHz will be called a "Model 1700+," the 1.4GHz a "Model 1600+," and the 1.33GHz will be named "Model 1500+."

Although pricing had not yet been set at press time, the Model 1800+ is expected to cost less than $300. We should have benchmark numbers in next month's issue.

Intel's flagship now runs at 2GHz.

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MUST HAVE HARDWARE

CHIPSET MANIA!

CPUs are only as strong as the chipsets that run them, so if you're a hardcore upgrader, you must read our following survey of the latest core-logic offerings.

Intel sued VIA over its P4 DDR chipset.

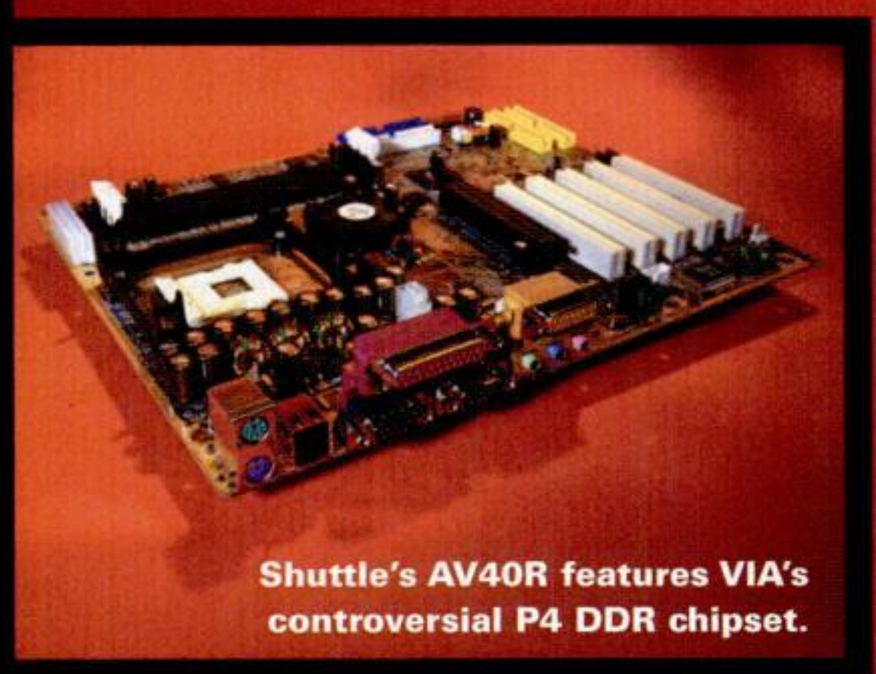
ALI BOARDS THE ATA/133 BUS

Acer Labs (**www.acerlabs.com**) always throws a few curve balls, and its new **ALADDiN-P4 M1671** chipset is like a big, Gaylord Perry rainbow hanging over home plate. When they hit store shelves this fall, motherboards using ALi's ALADDiN-P4 should be the only ones to provide Pentium 4 DDR support, as well as Maxtor's new ATA/133 spec, which increases the maximum data rate for IDE devices to 133MB/sec. Of course, few of today's hard drives will hit that mark, but ALi and Maxtor believe the extra 33MB/sec over ATA/100 helps relieve pressure from the overhead of the IDE interface. As IDE drives smash the 137GB and 150GB mark this year, drives may indeed see a performance boost from ATA/133. The first ATA/133 drives from Maxtor (**www.maxtor.com**) should be available by the time you read this. The 7,200rpm D740X is expected to cost $250.

The ALADDiN P4 will also be one of the first chipsets to support upcoming **DDR333 memory**. Like PC2100, which sends data on the rising and falling edges of a 133MHz clock, DDR333 also hits both edges, but ups the clock speed to 166MHz. With an increased memory clock, ALi's P4 chipset could be the RDRAM killer everyone has been looking for. Boards from the usual suspects are expected to be on shelves as early as Thanksgiving. Pricing will depend on the features of the individual motherboards, but are expected to run from under $100 to $150.

VIA'S ROGUE P4X266 P4

If you manage to get ahold of a motherboard using VIA's new **P4X266 Pentium 4 DDR chipset**, you could well have a collectible. Intel has sued VIA (**www.viatech.com**), arguing the company doesn't have the right to build chipsets for the Pentium 4. That hasn't stopped VIA from bringing the chipset to market. While few of the established motherboard makers have said they will use the P4X266 chipset, smaller makers such as Shuttle (**www.spacewalker.com**) have boarded the bus. Shuttle has two mobos cooking: the **AV040** and the **AV40R with RAID**, priced at $100 and $120, respectively. Both boards feature five PCI slots and support ATA/100, PC1600, and PC2100.



Shuttle's AV40R features VIA's controversial P4 DDR chipset.

The P4X266 looks to offer roughly the same performance as the dual-channel RDRAM i850 chipset—not bad for a chipset that works with the much cheaper DDR memory—and doesn't require that you purchase memory in pairs. The big question, of course, is whether Intel will also go after the actual motherboard manufacturers using the rogue chipset.

INTEL GIVES PC133 SUPPORT TO THE P4

For all those who "just said no" to RDRAM, Intel is finally offering a solution: a Pentium 4 chipset that uses PC133 SDRAM. Its name is **Intel 845**, and it's been tweaked with a very deep in-order queue length, which allows the chipset to store up to 12 requests. The 845 also supports 24 open memory pages (the P-III's 815 chipset can support just four), and features a 256-bit internal data path (the 815's is 64-bit).

ASUS' P4B features the new Intel 845 chipset.

But how does the 845 perform? Early reports say fair-to-mediocre; see Rob Pratt's column on page 70 for details. The 845 isn't a total dog, but Intel-minded high-performance freaks will definitely want to steer clear of it in favor of RDRAM chipsets. Still, motherboard manufacturers look to be embracing the 845, which is no surprise considering the legendary reliability of Intel chipsets and the fact that PC133 is practically free these days. Look for 845 boards from Tyan, MSI, Chaintech, and Asus. Perhaps the most feature-packed board around is **Asus' P4B** (**www.asus.com**), which lets you tweak the boot-up logo and has a "talking" BIOS.

NVIDIA NFORCE ADDS INTEGRATED POWER

This fall, motherboard chipsets with integrated graphics will no longer be the laughingstocks of the PC power user world. Well, most will, but not the **nVidia nForce** (**www.nvidia.com**). This new chipset includes technology left over from an aborted Athlon-based Xbox project. (Yes, at one time Microsoft's gaming console was being developed to include an Athlon, but it will launch with a 733MHz P-III instead.) The nForce will support Athlon CPUs (no surprise there), and looks to offer the most powerful integrated graphics in any chipset around. What we're talking about here is essentially the GeForce2 core. In fact, nVidia says a system running nForce will be *faster* than a system running a GeForce2 card plugged into an AGP slot, because the graphics processing unit will have a direct, on-die interface with the chipset itself.

The nForce's basic chipset functions don't look shabby, either. In the high-end 420D version of nForce, you can expect 128-bit DDR memory support, a special high-speed interconnect between the higher and lower functions of the chipset, and the ability to encode DirectX surround sound and output it to Dolby Digital 5.1 in realtime.

As is the case with Intel's 815 chipset, you'll be able to switch off the nForce's internal graphics and plug in an external AGP card. Likely motherboard partners include Asus, Microstar, Abit, and Gigabyte. Expect shipping products by November, with prices ranging from $100 to $200 depending on feature sets.

Intel's 845 PC133 gives you cheap P4 performance.

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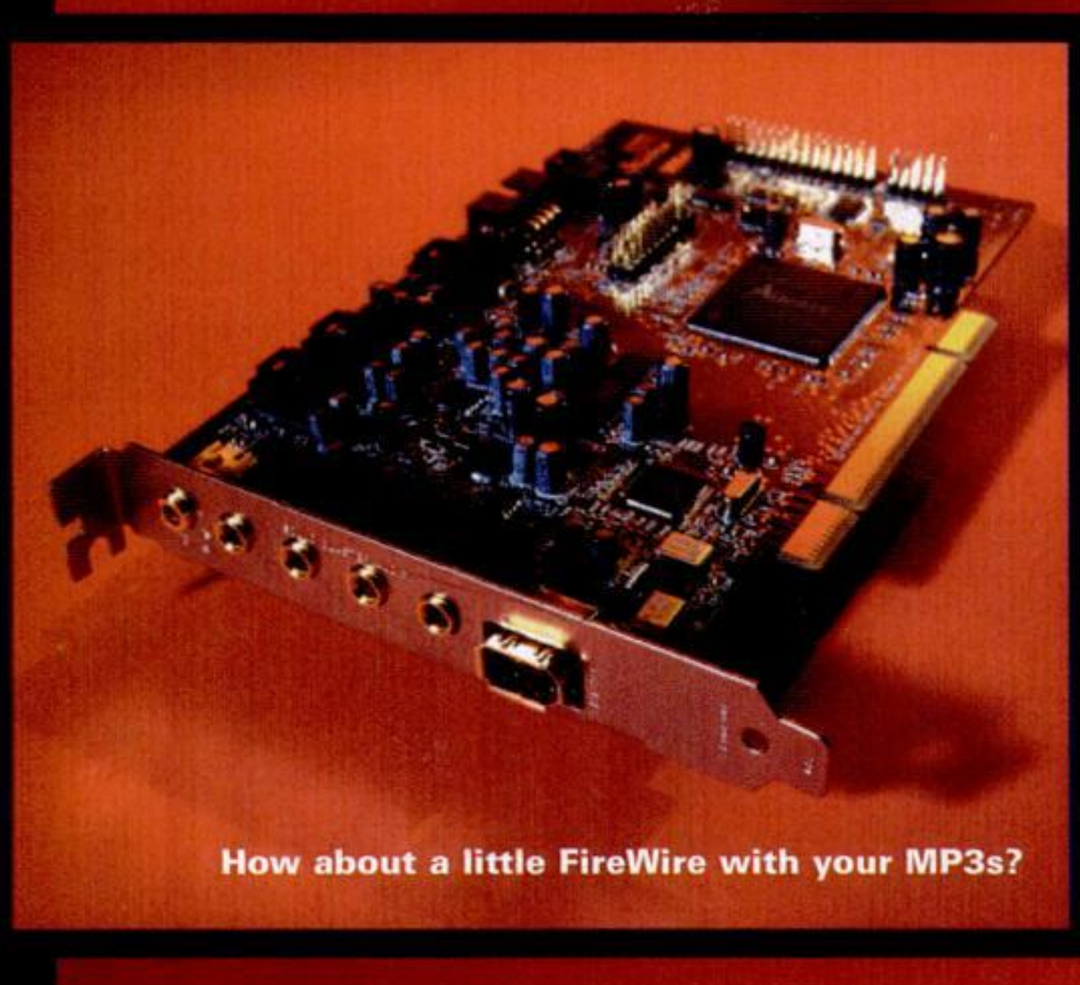
MUST HAVE HARDWARE

SOUND BLASTER AUDIGY'S ULTRA HI-FI

Creative Labs' latest soundcard, the **Sound Blaster Audigy** ($100–$250, **www.creativelabs.com**) prepares your PC for the coming wave in high-definition audio. Traditional "Redbook audio" (the sound you hear on regular music CDs) samples analog audio at a rate of 44.1KHz with 16-bit resolution, meaning the analog-to-digital converter samples the analog waveforms 44,100 times a second and records the samples with 65,536 discrete bits of information. Audigy's next-gen chip ups the ante to 96KHz and 24-bit recording. That's more than twice the sampling rate and 16.7 million bits of information to describe each sample. In sum, the faster the sampling rate, the wider the range of audio frequencies you retain from the original source. The higher bit rates amount to more dynamic range and less signal noise.



How about a little FireWire with your MP3s?

The Audigy's brawny DSP delivers a range of frequencies that's two times greater than the most acute human hearing. Those extra frequencies may be indistinguishable to your ears, but they make a big difference, adding clarity and power to the frequencies you *can* hear. That's why the DVD Audio spec insists on 96KHz and 24-bit resolution for each channel on DVD discs.

Besides offering better sound quality, the Audigy also includes new features that should make game environments sound more realistic and enveloping. In fact, Creative's new EAX Advanced HD positional audio adds five promising features:

- Environment Morphing makes the transitions between audio environments sound more lifelike.
- Environment Panning lets you hear, for instance, gunshots in a nearby warehouse and a helicopter winging up a canyon in the distance—both from precise locations in the sound field.
- Multi-Environment allows the Audigy to reproduce the reverberations of footsteps walking down a narrow hall and the sound of a voice in a large room simultaneously. In fact, up to four audio environments can be reproduced in real-time to sculpt very specific structures in the sound field.
- Environment Reflection simulates the initial reverberations of a sound in its environment. In a process similar to echolocation, these first few reflections tell us instinctively whether we are in a large room, a cave, or a canyon.
- Environment Filtering allows sound designers to reproduce the tonal nuances of sounds that emanate in wide-open spaces.

The Audigy isn't the first high-definition soundcard, but it's a quantum leap ahead of all other consumer-level products. Cirrus Logic's CS4630 DSP chip (used in the GameTheater XP from Hercules) supports up to 20-bit audio resolution, but the Audigy's extra four bits of resolution make a big difference in our tests. See our review on page 77.

DLP TVS: BIG PICTURE, ASTRONOMICAL PRICE

Texas Instruments' digital light processor, or DLP, is a tiny microchip coated with thousands of tilting mirrors that can reflect light in such a way that an image is formed on a screen. This image can be either front-projected (as is the case with a portable DLP projector) or rear-projected (as in a rear-projectionTV set). The main benefit of DLP technology is it makes for a much smaller physical footprint in rear-projection displays. Indeed, those DLP units are a lot smaller than the bulky CRTs.

While undoubtedly one of the coolest of the new technologies arriving this year, DLPs haven't been seen much in the real world, aside from a few ultra-light projectors. This should change over the next few months. Mitsubishi has announced its **65"WD-65000** ($15,000, **www.mitsubishielectric-usa.com**), while Panasonic is going after the, ahem, *budget* DLP crowd with its **52" PT-52DL10** ($13,000, **www.panasonic.com**). We'll be reviewing new DLP-basedTVs and monitors—and with any luck, reporting lower prices—in upcoming issues.

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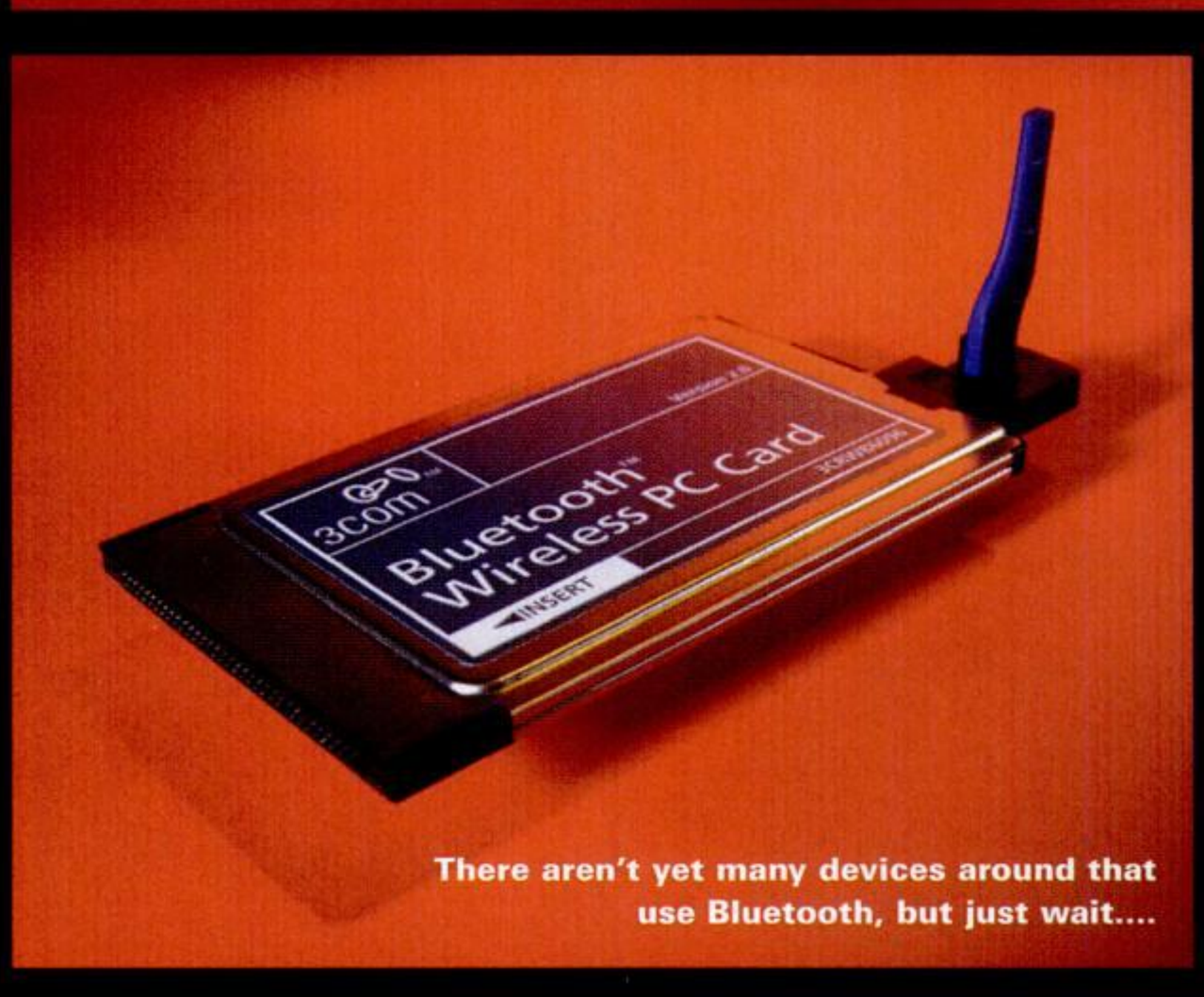
BLUETOOTH TECHNOLOGY: SERIAL CABLES, MARK II

It's an ugly scene behind your desk: a nasty-looking snarl of cables connecting your PDA, digital camera, MP3 player, gamepad, headset, and speakers. Enter Bluetooth, the technology that's intended to clear away all your cables (save your monitor and Ethernet lines), replacing them with a uniform spec for wireless communication among traditional peripherals and new-fangled handheld devices.



There aren't yet many devices around that use Bluetooth, but just wait....

Bluetooth doesn't just aim to eliminate cables—it also wants to completely ease the pain of configuration. Do you want your PDA to sync with your cell phone? Simply mash sync on your PDA, then accept the sync on both the PDA and phone. Voilà! The two devices will sync automatically forever after. Or at least that's the plan.

The catch is that in order to enjoy this new level of functionality, all your peripherals need a Bluetooth-enabled chip. So far, we've seen only a single Bluetooth product—the **Bluetooth Wireless PC Card** from 3Com ($150, www.**3com.com**). One product does not an auspicious technology launch make, and it must be noted the Bluetooth spec was ratified more than three years ago. Luckily, there is a bright light on the horizon. Palm is shipping its Bluetooth SDIO (Secure Digital Input/Output) Card in December, which will let users with Bluetooth Palms and PCs sync wirelessly, transmit data from Palm to Palm over a much wider range, and wirelessly connect to the net via a Bluetooth cell phone. Fujitsu has announced a line of laptops that have removable Bluetooth keyboards, and we can't wait to sync our phones and PDAs with our PCs via Bluetooth.

At a maximum transfer rate of about 1Mbps and a range of about 30 feet, you'll quickly realize that Bluetooth doesn't aspire to be a wireless networking standard.

Nonetheless, despite a phenomenally slow start, we still see a bright future for Bluetooth, especially as PDAs, digital cameras, and other "new age" peripherals gain in popularity. Expect to see "Bluetooth-enabled" stickers on almost every kind of PC peripheral and laptop in the next year, at little or no additional cost.

POCKET XP?

Microsoft continues to grind down Palm OS with the release of **Pocket PC 2002** (**www.microsoft.com**). Featuring a skinnable interface and updated media player like its big brother Windows XP, Pocket PC 2002 isn't a quantum leap forward. Still, its features are sure to win a few converts, particularly in the corporate market, with built-in features such as VPN support, stronger password support, and a slick remote-terminal-services client that lets the unit log into Windows 2000 Server. All Pocket PC devices will also ship with Universal Beaming to enable data exchange with Palm OS devices and wireless phones. Expect the new OS, and devices that use it, to be introduced in early October.

Will Pocket PC 2002 let Microsoft finally overtake Palm? It's unlikely, but the OS shows Microsoft isn't playing around. It's now up to Palm to improve as well.

Hewlett-Packard's Jornada 565 packs a 206MHz StrongArm CPU, 32MB of RAM, and Pocket PC 2002, and runs for 14 hours.

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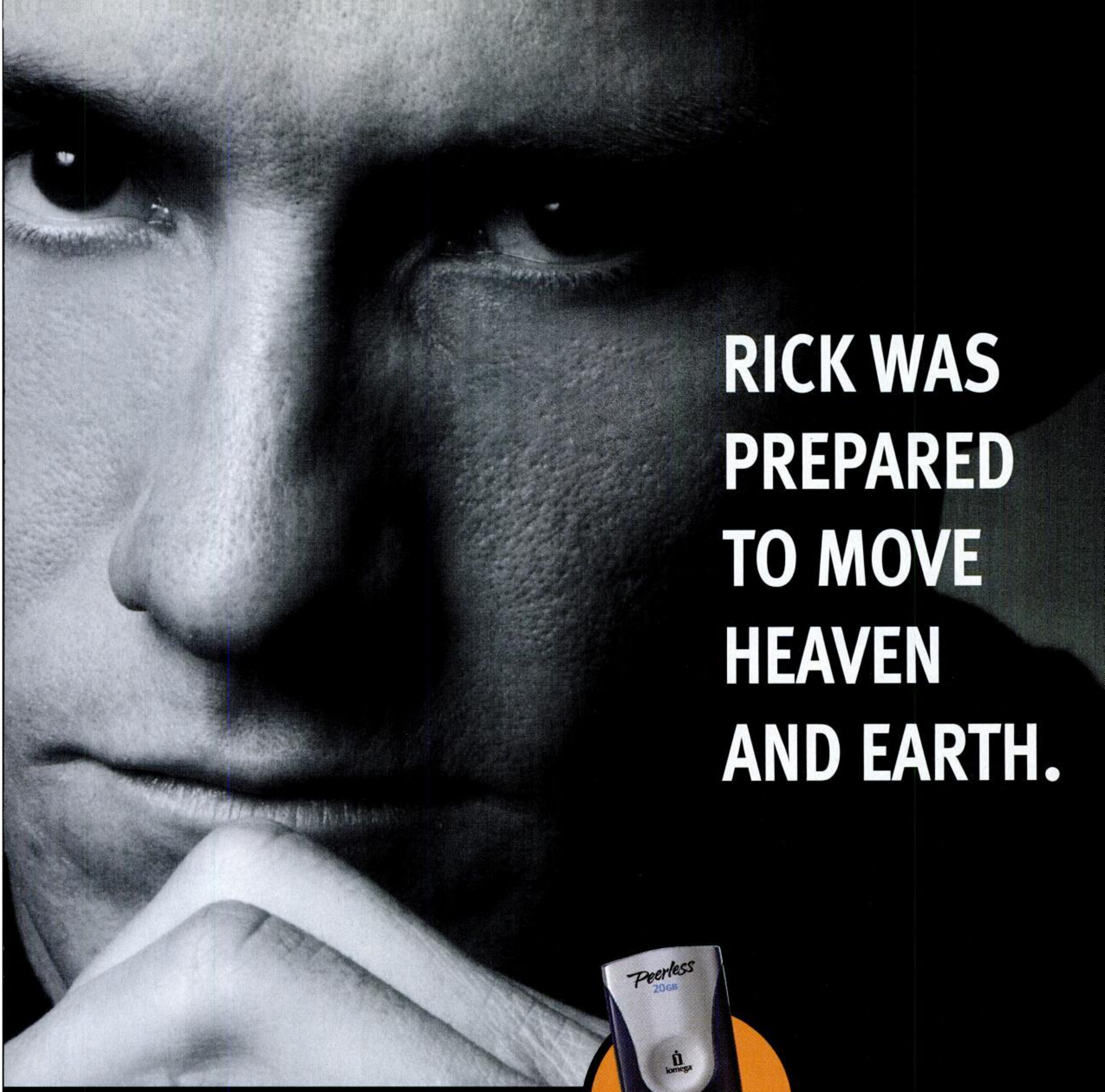

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MUST HAVE HARDWARE

HP's dvd100i is almost out of the gate.

INTRODUCING THE FIRST DVD+RW RECORDER—AGAIN!

The DVD+RW lobby has been teasing us with promises of products "just around the corner" for quite a while. Unfortunately, the products have *stayed* around the corner for three years now. But the release of Pioneer's DVR-A03 drive—which uses the competing DVD-RW standard—seems to have lit a fire under the collective ass of the +RW folks, because at last, the first +RW drive is shipping. The release of the **Hewlett-Packard dvd100i** ($600, **www.hp.com**) is the first warning shot across the bow of DVD-RW, and it debuts at $400 less than Pioneer's drive when it was introduced.

The DVD+RW Alliance says its format offers greater compatibility with set-top DVD players than -RW does. But, as we've noted before, we've had no problems with -RW burns in any of our stand-alone DVD players. However, +RW does have a leg up on Pioneer because it uses CAV recording, which provides faster data access and transfer rates than -RW's CLV recording method. And HP has notched up the specified +RW writing speed slightly—the first drive will record to DVD at 2.4x, nearly a 20 percent improvement over Pioneer's current 2x.

Like Pioneer's A03, the dvd100i isn't just for recordable DVDs. At 12x10x32x, it's not terribly fast for CD-R/W reading and writing, but it's faster than the A03 and offers more than enough speed to serve as a supplemental optical drive. The drive is equipped with an 8MB buffer, as well as buffer-underrun protection for CD-R (all recordable DVD formats are already able to pause the burning process).

Now that the battle has left the boardrooms and is headed for the store shelves, you can expect more +RW drives from PC heavies including Ricoh (**www.ricoh.com**), Sony (**www.sel.sony.com**), and Philips (**www.philips.com**) within the next six months.

The prospect of another drawn-out standards war might give you an upset stomach, but there's a silver lining: As these drives become more popular, media prices will plummet. +RW media will be introduced at $16 for 4.7GB, while the same capacity for –RW media can now be had for as little as $10 each. ■

NEXT YEAR'S CONVERGENCE

Maximum PC **reveals its wish list for the next big wave of PC products.**

Gordon Mah Ung declares...
"I want to see an RDRAM chipset for the Pentium 4 that not only pushes the memory clock from 800MHz to 1066MHz, but also widens the data path from the current skinny 16-bit width to 32-bit, or even 64-bit. The resulting bandwidth could finally settle the RDRAM versus DDR debate for good. Both Intel and Rambus have talked about the potential of RDRAM for a long time, but we have yet to see the pair advance significantly. Intel's Tulloch chipset, which could very well feature these enhancements, is currently nowhere to be seen."

Logan Decker demands...
"I want a USB 2.0 MP3 player, and I want it now. Trying to pump 128 megs of MP3s onto my player through my current USB port is like trying to stuff a fat lady through a subway turnstile—you can do it, but it ain't going to be pretty."

Jon Phillips contends...
"I want the perfect racing wheel/pedal set. First, it's Bluetooth-enabled, so I can avoid all the messy wiring that keeps me from using my current wheel as often as I should. Second, the base of the pedal assembly features Velcro attachments to keep the sucker stationary for people with carpeted floors. Third, I want Formula One–style paddle shifters that actually blip the throttle during downshifts—and I want to feel those blips with a sublime force-feedback effect."

Will Smith remonstrates...
"I'm sick of playing games that look the same on a TNT2 card as they do on a GeForce3 or Radeon 8500. I want to see games that *use* the programmable pixel and vertex shaders in my 3D accelerator. I want to see games that *only* run on a card with programmable shaders. I want to see voice communication in all team-oriented first-person shooters and full support for 5.1 sound in all games. You didn't buy a set of Klipsch 5.1s to listen to DVDs—you want to *play games*."

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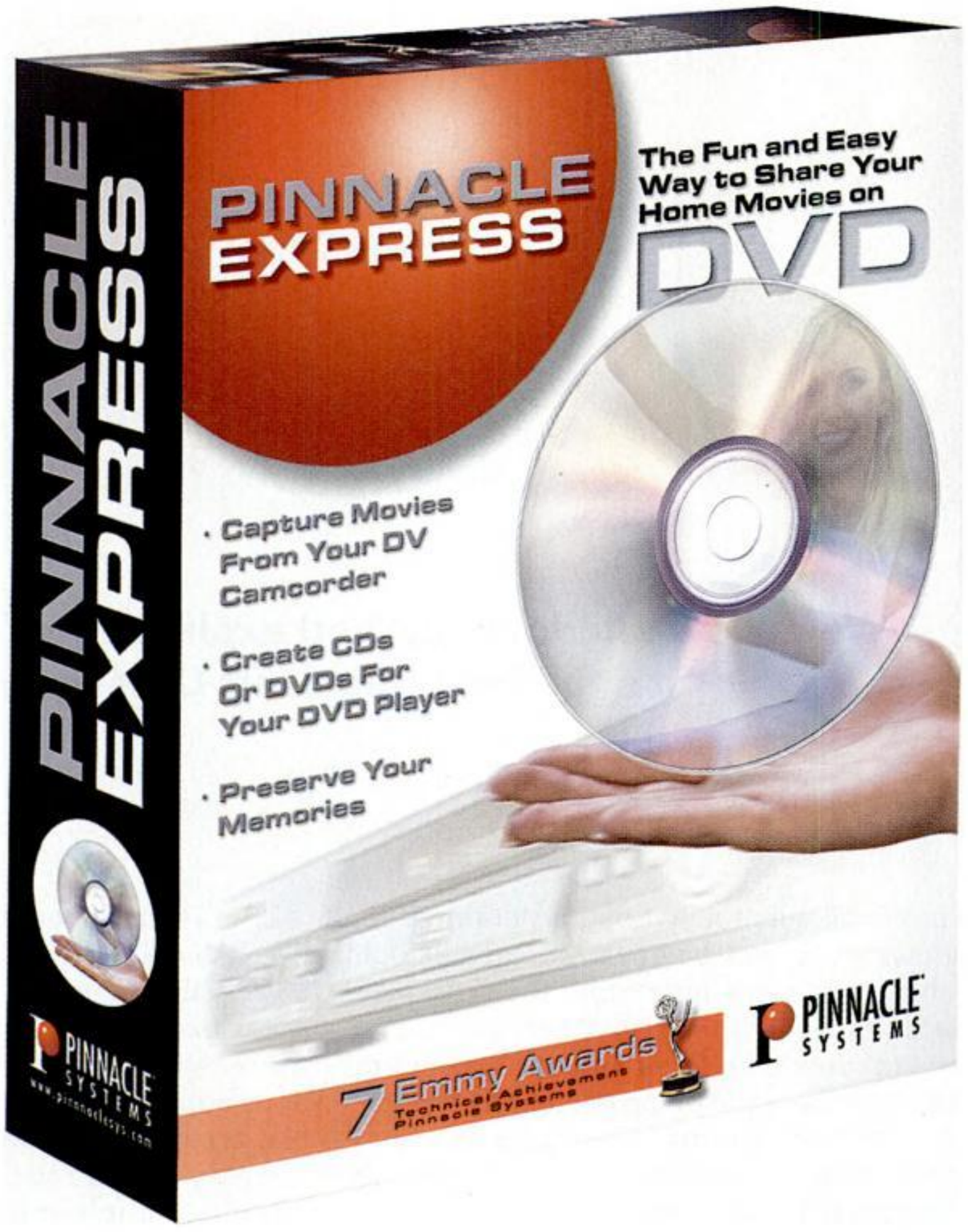

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Windows XP Xposed!

We review Windows XP and explain why it's the best Microsoft OS ever.

MAXIMUM PC KICK ASS PRODUCT

Face it: We all eventually bought Windows 98, Windows 98 SE, and Windows ME, even though we knew they were little more than glorified service packs with some new driver support and a hefty price tag. So we understand your skepticism about yet another iteration of the Microsoft OS. Well, get over it. Windows XP is the OS we've been promised for years, the one that finally brings the 32-bit überkernel at the heart of Windows 2000 to the home desktop. It's fast, remarkably stable (we've yet to see our test systems crash after six months of both beta and final-gold use), and it comes wrapped in a fancy new interface that's decked out with tons of built-in conveniences.

But, hey, if you'd rather have a hooptie OS that crashes all the time and a hooptie interface to match, feel free to stick with what you've got. Otherwise, take a look at what makes WinXP so impressive to even uppity tech-snobs like ourselves. All of the following comments refer to our experience with the final retail version of the OS, which we received in late August.

Bye-Bye Blue Screen of Death

You'll see two different versions of WinXP on store shelves: the Home Edition and the pricier Professional Edition. Unless you require multiple CPU support, the ability to connect to a WinNT domain, or Offline Folder support, save yourself a hundred bucks and get the Home Edition.

Both versions benefit from the stability of the pure 32-bit WinNT kernel, which is far more reliable than 95/98/ME's hodgepodge of 16- and 32-bit code, which dates back to the DOS days. Why is the NT kernel more reliable than 95/98/ME's? Because 95/98/ME apps aren't prohibited from writing to the most crucial areas of memory that control things such as memory access and CPU allocation, and such writes often result in unrecoverable system crashes. In WinXP, these areas can only be written to by the OS. And even when an application that's integral to the OS (such as explorer.exe) gets hung up, it's easy to kill the offender and restart the application using Task Manager—reboots aren't necessary.

Another feature that contributes to the stability of WinXP is its NT file system (NTFS). Even a simple brownout can damage the FAT32 file allocation tables found in previous versions of Windows, and once that happens, you can kiss your data goodbye. NTFS, on the other hand, stores duplicate copies of its file tables in different areas of the disk, so one disk error can't render all the data on a disk useless. Also, under NTFS you can set permissions for individual files and users; this is a lot more comprehensive than just password-protecting network shares in previous Windows versions. Our benchmarks show that large drives formatted with NTFS also perform better in WinXP than they do in Win2000, thanks to improved disk access routines. And speaking of Win2000 issues, unlike other NT-based OSes that

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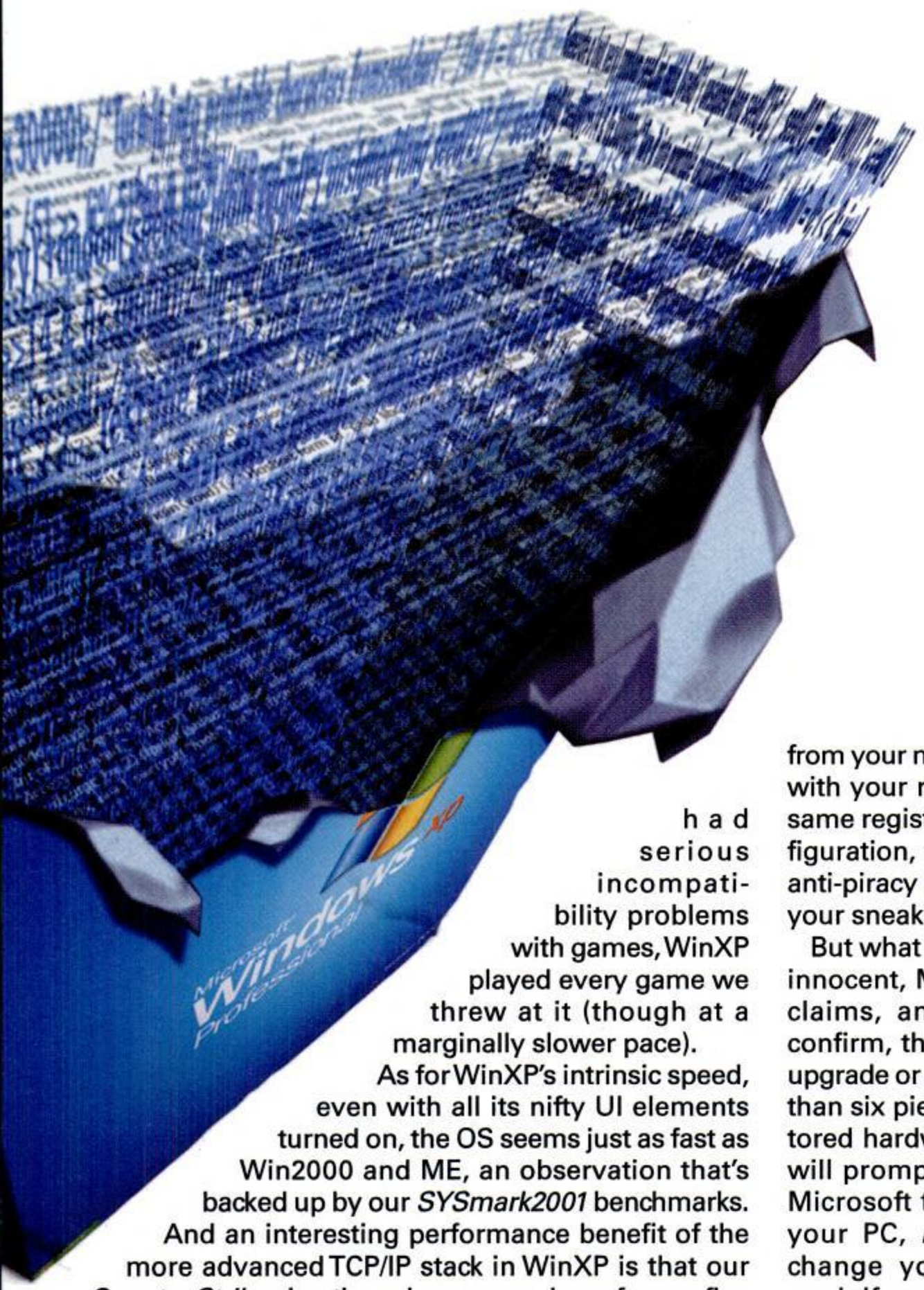


had serious incompatibility problems with games, WinXP played every game we threw at it (though at a marginally slower pace).

As for WinXP's intrinsic speed, even with all its nifty UI elements turned on, the OS seems just as fast as Win2000 and ME, an observation that's backed up by our *SYSmark2001* benchmarks. And an interesting performance benefit of the more advanced TCP/IP stack in WinXP is that our *Counter-Strike* ping times have gone down four or five milliseconds compared with what we recorded while hitting the same servers when running WinME.

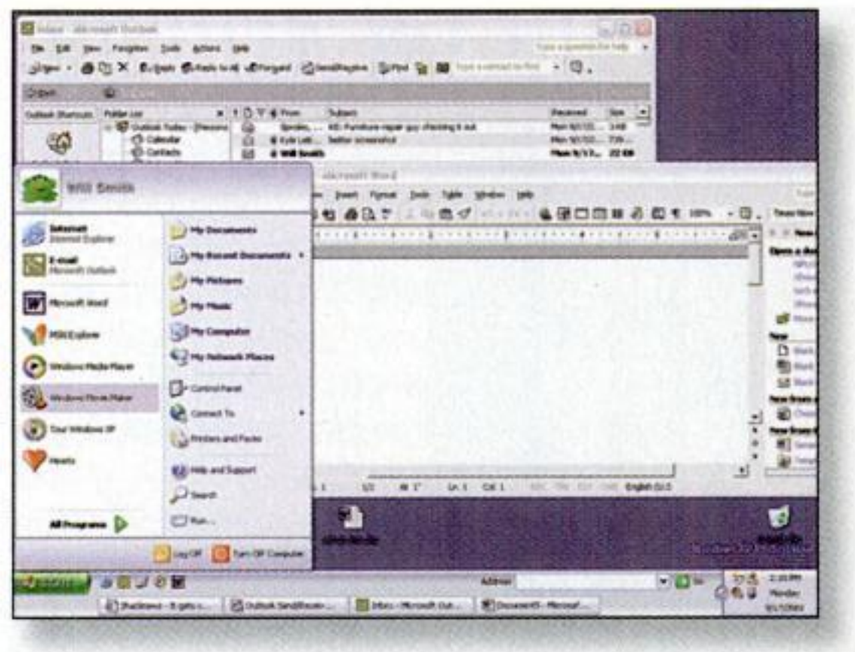
By repurposing the rock-solid, 32-bit kernel from Win2000, the WinXP development team was able to turn its attention to important usability improvements. The first thing you'll notice is the new interface, code-named Luna. In a sudden fit of tidiness, Microsoft moved a bunch of annoying desktop items to the Start Menu, which also contains a dynamically updated list of the applications you use most frequently. Larger interface buttons and icons allow you to crank up your desktop resolution to 1600x1200 without having to make cumbersome adjustments to desktop preferences. On top of the new interface changes, there are several new features—such as a basic, integrated CD-burning app and content-sensitive folders—that really can improve a user's experience.

WPA: The Pirate's Scourge

Despite the sophistication and ingenuity of the new OS and interface, the bogeyman of Windows Product Activation has marred WinXP's prelaunch buzz. Is it as bad as it's made out to be? No. Will it keep you from upgrading your PC at will? Probably not. Will it keep you from installing the same copy of Windows on all three of your PCs? Yes.

The entire skinny on how Product Activation works can be found in last month's WinXP feature, but the short story is that the feature generates a 50-digit code from your machine's hardware and associates that code with your registration code. If you try to activate the same registration code with a *different* hardware configuration, the proverbial alarm bells sound, and the anti-piracy police come a-running to put the kibosh on your sneaky little operation.

But what happens if you simply try to upgrade your innocent, Microsoft-sanctioned machine? Microsoft claims, and our tests confirm, that when you upgrade or change more than six pieces of monitored hardware, the OS will prompt you to call Microsoft to reactivate your PC, *if* you don't change your network card. If you do change your network card, you can upgrade only four pieces of monitored hardware. And every 120 days, the slate is wiped clean, so you can upgrade at will. Rather than take Microsoft's word on how WPA works, we began swapping out parts one at a time—first the videocard, then the soundcard. Then we swapped four 64MB RIMMs for two 256MB RIMMs, upgraded the CPU to a 1.5GHz, and replaced the network card with a 3Com 905b we had lying around the Lab. After we changed the NIC, we were finally prompted by WinXP to reactivate the OS. We also confirmed that you can change six pieces of hardware without being hassled by Microsoft goons, as long as you leave the network card alone.



You probably already know that WinXP includes a new interface, but you probably didn't know that it's so easily configurable you can change almost every aspect of the GUI, as illustrated here with our shiny, silver Start Menu.

If your PC ships with WinXP pre-installed, Product Activation works a little differently. Instead of looking at your hardware and generating a number, WinXP uses a section of the BIOS identifier—that long number that shows up at the bottom of your boot screen. So, on OEM boxes, you can upgrade hardware as much as you want, until you change your motherboard. At that point, your Product Activation will revert and behave as described above.

It's definitely an annoyance. But after we clocked the new system, we decided it was one we were willing to live with. And now... on to the benchmarks!

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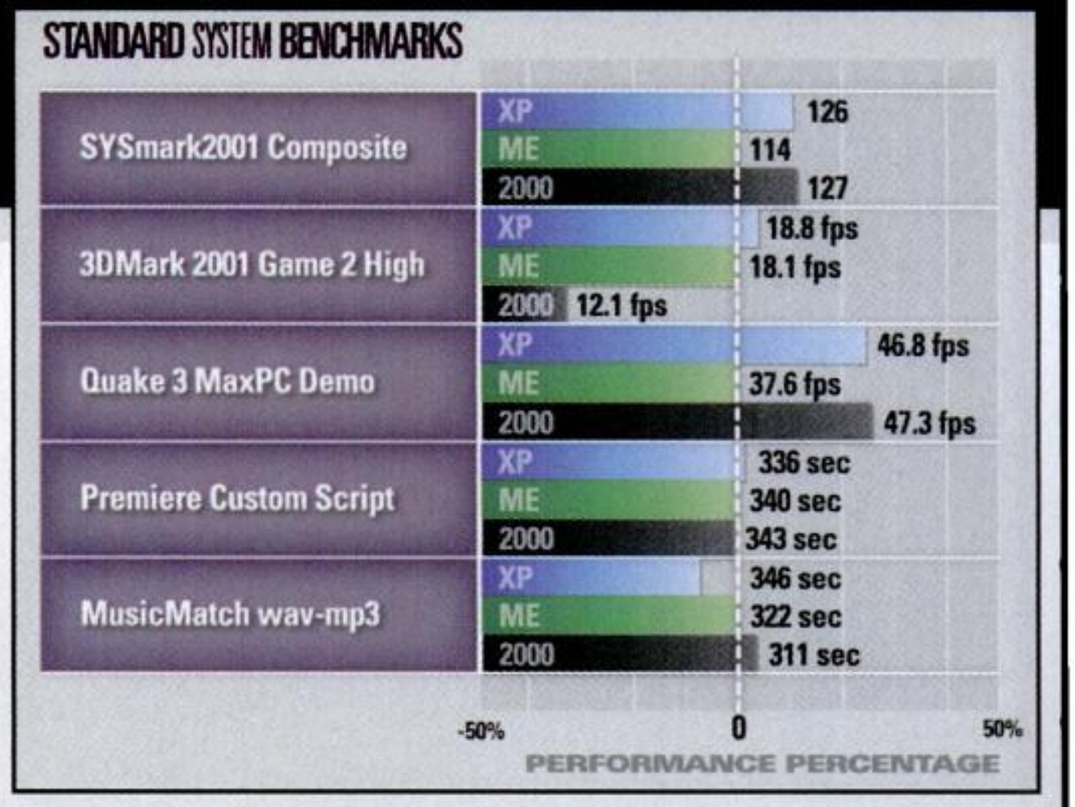
BENCHMARKING the BEAST

In order to see what kind of performance hit (or gain) a WinXP upgrade incurs, we loaded our Pentium 4–based test beds with Windows XP Home, Windows 2000 Professional, and Windows ME for comparative testing—same hardware, same benchmarks, different OSes. After updating to the latest chipset and the 20.81 GeForce2 Pro drivers, we ran a bevy of benchmarks on all participants. Our goal was to test general application and gaming performance, as well as unusual areas where Microsoft claims performance improvements, such as in large hard-drive disk access, application load times, and boot times.

LEGEND

Win XP | Win ME | Win 2000 Pro

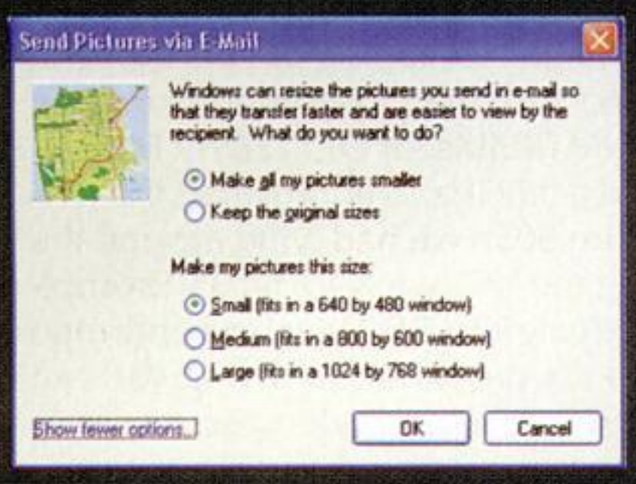


We ran our standard desktop system tests on WinME, Win2000 Pro, and WinXP Home. WinXP performed almost the same as Win2000 and better than WinME. Note: These are not the same WinME scores you'll find in the benchmark charts in the reviews section; new drivers have helped our zero-point system achieve faster frame rates in WinME.

WinXP's Most WHIZ-BANG FEATURES

MIGRATION WIZARD

Most every *Maximum PC* reader knows the pain and pleasure of a clean OS install. When you've done this in the past, you also had to manually reinstall all your apps, *then* restore things such as your mail file, Internet connection settings, and network configuration. To help alleviate this annoyance, WinXP includes a Migration Wizard, which grabs your files and settings from your old computer and saves them to a network drive, CD-R, or pretty much anything else. We've found that the migration wizard works best if you first install your usual-suspect applications on your new PC, then use the wizard to copy everything over, instead of trying to install files for apps that aren't yet present.



RESIZE PICTURES FOR E-MAIL WIZARD

We were absolutely thrilled when we first began e-mailing a few digital snaps to a colleague and WinXP asked us if we'd like to resize those images to minimize upload and download times. Not only does the OS resize a 3-megapixel image to a more reasonable 640x480, but it also converts uncompressed images (such as TIF and BMP files) to the compressed JPEG format, guaranteeing that anyone with a web browser will be able to view them.

ROLL BACK YOUR DRIVERS

Ever installed a naughty driver that borked your videocard settings, your soundcard settings, or your LAN configuration? We have, and we've lived with the consequences. In Win95, a bad driver install frequently meant that you'd be up until the wee hours of the morning re-installing Windows. WinXP has further refined System Restore, which was first introduced with WinME. Now if you install a bad driver, WinXP can look back into previous System Restore checkpoints and restore the earlier version of the nonfunctional driver, without having to restore everything else. This is a helluva lot better than WinME's all-or-nothing approach.

WIRELESS LAN SETUP

Setting up a home network is never particularly easy, and setting up a wireless LAN is hell for the uninitiated. Every vendor has a different application for setting SSIDs and WEP keys, and switching from one network to another. But you don't need to fret if you're running WinXP. Now, the Network Properties page for a Wi-Fi device contains several additional tabs to facilitate configuration of cards. If that's not enough for you, WinXP will even sniff around the airwaves and find available Wi-Fi LANs for you to connect to.

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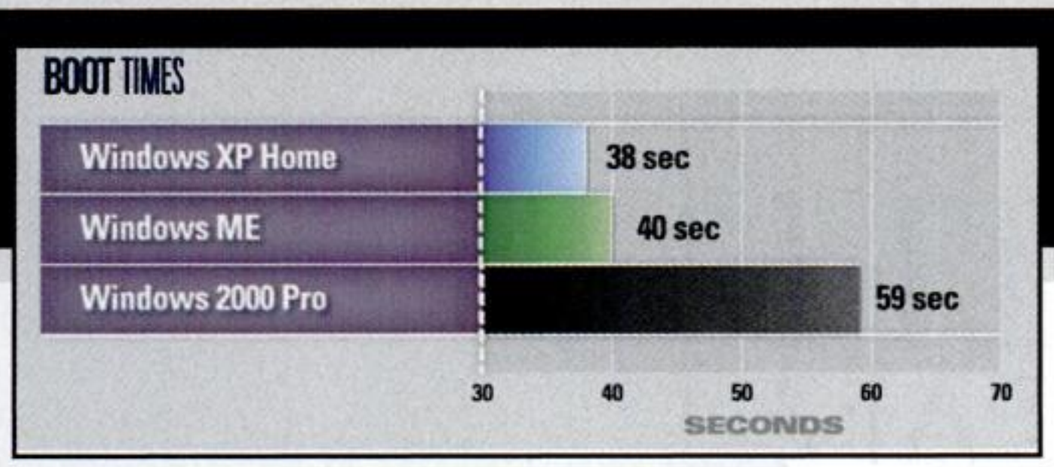

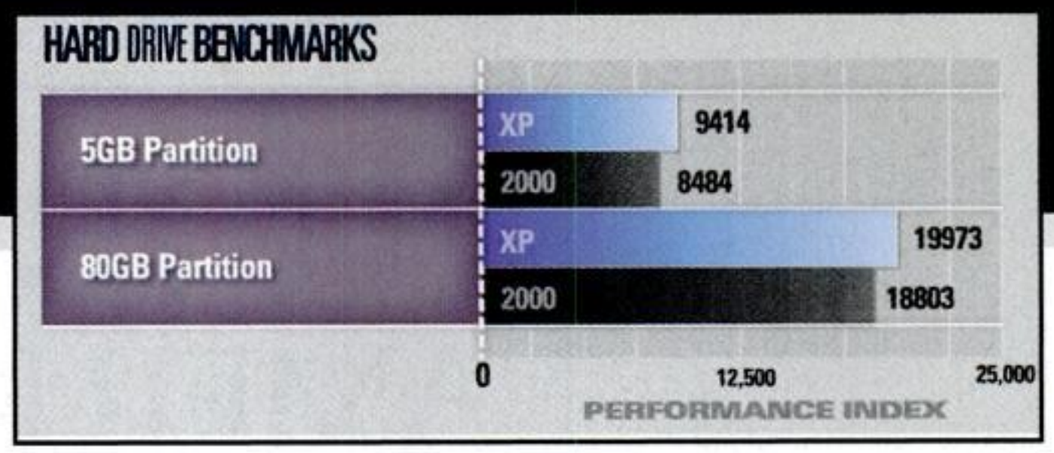

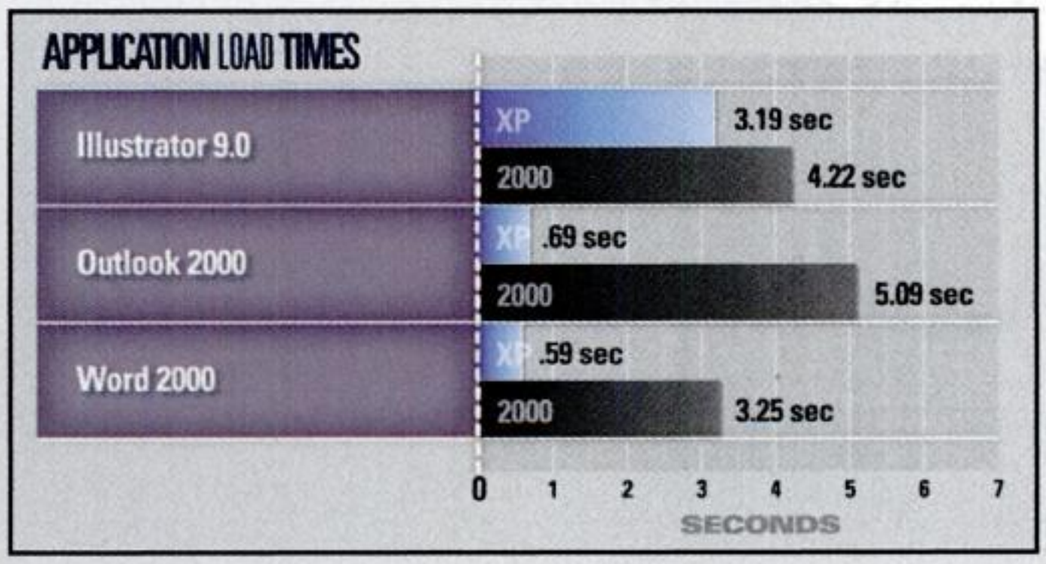

Boot times: To gauge boot times, we simultaneously press the PC's power button and a stopwatch, then stop the stopwatch when Windows' hourglass disappears. Guess what? XP kicked 2000's ass.

Application load times: Because WinME doesn't support NTFS, it was left out of this comparison for the sake of fairness. Times are recorded by clicking on an app in the Start Menu, then stopwatching how long it takes for the app to fully start. Microsoft was right: XP does load apps faster. Much, *much* faster.

Hard drive performance: Using *SiSoft Sandra's* hard drive benchmark, we were able to measure the performance gains enabled by XP's updated version of NTFS and disk cache optimizations. The spikes were nominal, but visible nonetheless.

DESKTOP AND SYSTEM TRAY CLEANUP WIZARD

Are you one of the thousands of people whose desktop is filled with crappy icons? How 'bout your system tray? Does it have 25 little apps running at all times? WinXP can't help your (obviously) cluttered mind, but it can at least make your PC seem less cluttered. By default, WinXP hides all those nasty System Tray apps that are installed and never do anything for you. Now, granted, it doesn't actually *unload* the little bastards from memory, but at least you'll regain some semblance of order.

As for the desktop litterbugs, WinXP keeps track of how often you use the icons on your desktop. Every few months, the OS prompts you to clean up your desktop. It tells you when you last used shortcuts on your desktop and allows you to move the unused or infrequently used shortcuts to another folder.

The Bottom Line

WinXP represents the most useful and compelling OS release we've ever seen from Microsoft—it really *is* a better experience. It's fast, sophisticated, and packed with usability enhancements, all of which are easily accessible by even the most clueless newbies. Does it have any bugs? Surely, it must. All OSes are packed with lines of errata. But we didn't encounter any broken features, and as stated above, the OS was as dependable as Gary Cooper. Does it demand considerable memory and CPU resources? Indeed it does. This review isn't a referendum on the economy of Microsoft's code. And hey, we're *Maximum PC*—we evangelize high-powered hardware for a reason. Streamlined OS code is a beautiful thing, but we'd gladly give up a few CPU cycles and a few megs of memory if it meant switching to an OS that can run the absolute largest library of games and applications (and yes, Linux users, that's a dig).

Despite the brouhaha over Product Activation, we find no fault with Microsoft trying to protect its primary source of income. If Product Activation does prove successful, we expect (or at least hope) to see even more dramatic price decreases than those that have already been announced with the Home Licensing Plan. If we have to tolerate the annoyance of Product Activation, we fully expect to see some benefit from it.

We strongly recommend upgrading to WinXP if your computer is less than two years old and you have more than 128MB of RAM. In fact, we expect to see all new systems we review running WinXP by the end of the year and will be disappointed if we see otherwise. The stability of Win2000 combined with the compatibility of Windows 95/98/ME is something we've been waiting for a long time. Toss in the clean, efficient user interface—which you can choose *not* to use—and you've got a must-have OS upgrade, even for the most stalwart holdouts. ■

—WILL SMITH

MAXIMUMPC VERDICT

Windows XP
MICROSOFT

WHAT WE LIKE

Win2000 stability and WinME game support combine with great all-around performance to make a must-have OS upgrade.

WHAT WE HATE

Inevitable driver incompatibilities hinder almost any new OS, and we're still a bit concerned with the annoyance that Product Activation may bring.

PRICING

STAND-ALONE	UPGRADE
Home Edition: **$200**	Home Edition: **$100**
Professional: **$300**	Professional: **$200**

www.microsoft.com/windowsxp

10

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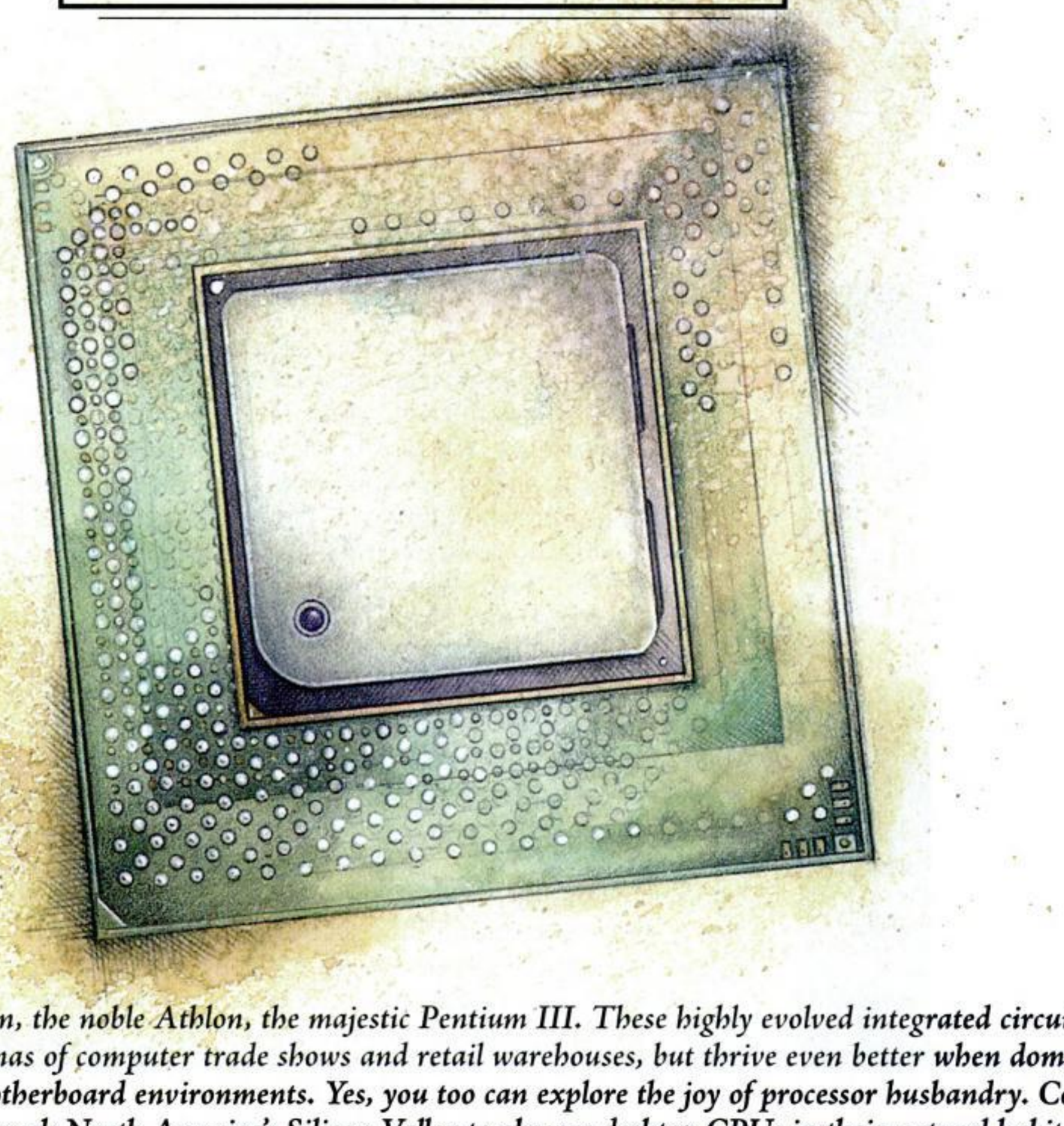
THE MAXIMUM PC COUNCIL ON PROCESSOR HUSBANDRY PROUDLY PRESENTS...

YOUR FIELD GUIDE TO

NORTH AMERICAN CPUs



Witness the wily Celeron, the noble Athlon, the majestic Pentium III. These highly evolved integrated circuits roam freely on the lush savannas of computer trade shows and retail warehouses, but thrive even better when domesticated in climate-controlled motherboard environments. Yes, you too can explore the joy of processor husbandry. Come with us as we take a tour through North America's Silicon Valley to observe desktop CPUs in their natural habitat—and if you see one you like, don't hesitate to stun it, trap it, and call it your own.

PC diversity is a beautiful thing. During the past 20 years, CPU watchers have enjoyed the emergence and evolution of literally dozens of CPUs. You can call it technological Darwinism at its finest—a rich gene pool driven by predation and survival, with the result being stronger, faster CPUs. For the purposes of this field guide, we will only retrace evolution's steps back to 1997, the beginning of the "modern" desktop CPU era, defined by the widespread emergence of closely coupled L2 cache in consumer processors. We start our safari with the more primitive CPUs, and work our way forward to the most advanced of the species. For the sake of convenience, we've divided the CPUs into three separate sub-species: the Intel, which roam the clean rooms of Santa Clara; the AMD, which call the rolling vistas of Sunnyvale their happy home; and the VIA, which can be found nestled in the vast moors of Fremont.

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Pentium II Klamath

Originally sired from the now-extinct Pentium Pro, the Klamath emerged as a stronger and more commercially viable beast than its server-side stock. While some thought the CPU's half-speed L2 cache would limit the breed's long-term survival, Intel's decision to propagate the Pentium nomenclature undoubtedly helped convince loyal Pentium enthusiasts to embrace the new animal. The Klamath's slot interface—a first for desktop processors—was initially regarded as an aberration, but it ultimately dominated Silicon Valley, and changed the very habitat itself. All Klamath breeds gallop at a 66MHz frontside bus clip.

D	May 1997	I	Slot 1
FQ	233–300MHz	L2	512K closely coupled
P	0.35-micron	L1	32K
TC	7.5 million	DS	203mm² V 2.8
CH	Intel 440BX, Intel 440LX, Intel 440FX, Intel 810, VIA Apollo Pro		

Pentium II Deschutes

Admirers of nature should always remember the significant roles that heredity and environment play in how creatures develop. The Deschutes clung to the essential core architecture of their immediate Klamath ancestors, but demanded much less power from their motherboard resources. The result was cooler CPUs that could run faster in the wild. The Deschutes were so frisky, in fact, Intel liberated the 100MHz system bus for free-range frolicking. The Deschutes were able to achieve their cool-runnings by adopting a more efficient 0.25-micron process technology. Still, circa 1998, even a state-of-the-art process couldn't allow Intel to move L2 cache directly to the CPU die (all of the CPU's circuits were needed for basic number-crunching). Thus the L2 cache sat off-die and ran at half-speed—an affront to nature that wouldn't be corrected until the advent of the Celeron A and P-III Coppermine.

D	January 1998	I	Slot 1
FQ	333–450MHz	L2	512K closely coupled
P	0.25-micron	L1	32K
TC	7.5 million	DS	131mm² V 2.0
CH	Intel 440BX, Intel 440LX, Intel 810, VIA Apollo Pro		

Original Celeron

Bearing the core architecture and daughter-card-based skeleton of the Pentium II, but not its protective shell, the original Celeron was bred with the intention of flooding the valley with inexpensive and easy-to-maintain stock—a direct response, some would say, to the ravenous herds of K6-II chips trapped by thrift-minded CPU collectors. Despite the Celeron's support for MMX's fast multimedia transformations, a complete lack of L2 cache condemned the first generations to an abbreviated lifespan—they just didn't run fast enough to attract serious game hunters. Restriction to the 66HMz system bus didn't help, either. Why Intel bred the original Celeron without L2 remains one of nature's mysteries. After all, data- and instruction-hungry CPUs absolutely depend on L2 cache for nourishment. Fortunately, Intel introduced 128K of L2 to the Celeron's "A"-rated progeny.

D	April 1998	I	Slot 1
FQ	266–300MHz	L2	none
P	0.25-micron	L1	32K
TC	7.5 million	DS	131mm² V 2.0
CH	Intel 440EX, Intel 440BX, Intel 810, VIA Apollo Pro		

Celeron A

This is the heartier Celeron stock that safari veterans remember most fondly. Intel breeders obstinately stuck with their policy of restricting the Celerons to the leash of a 66MHz bus, but the low-cost Celeron A—with its willingness to run faster and faster beyond its rated speed threshold—became a beloved companion to cost-conscious enthusiasts. Eventually, the Celeron shed its exposed cartridge format for a more familiar pin package and socket nest. The Celeron A not only included 128K of L2 cache, the L2 also ran at full-speed, a boon to both overclocking and increased performance.

D	August 1998	I	Slot 1, Socket 370
FQ	300–533MHz	L2	128K on-die
P	0.25-micron	L1	32K
TC	7.5 million	DS	153mm² V 2.0
CH	Intel 440BX, Intel 440 LX, Intel 810, VIA Apollo Pro		

Pentium III Katmai

Running on a 100MHz bus, the Katmai were the first CPUs to bear the distinctive SSE instruction set. SSE (streaming single-instruction multiple-data extensions) was a mutation of the familiar MMX instruction set, adding 70 new instructions and permitting up to four of these to be executed at the same time. This helped accelerate floating-point operations and thus the games and applications that rely so heavily on this kind of math. Also of note, the Katmai extended the traditional P6 core with the addition of eight new registers (i.e., storage cells for program instruction values). Despite their impressive adaptation to multimedia environments, the Katmai were reviled for bearing implanted ID tags that could hypothetically be read by a number of programs in a fenced-in habitat or even across the Internet. The tags were seen as a security threat by many conservationists, and BIOS manufacturers quickly adopted cutoff devices for the tags.

D	February 1999	I	Slot 1
FQ	450–600MHz	L2	512K closely coupled
P	0.25 micron	L1	32K
TC	9.5 million	DS	140 mm² V 1.65-2.05
CH	Intel 440BX, Intel 810/815/820, VIA Apollo Pro 133, ALi Aladdin Pro 4/5		

Pentium III Coppermine

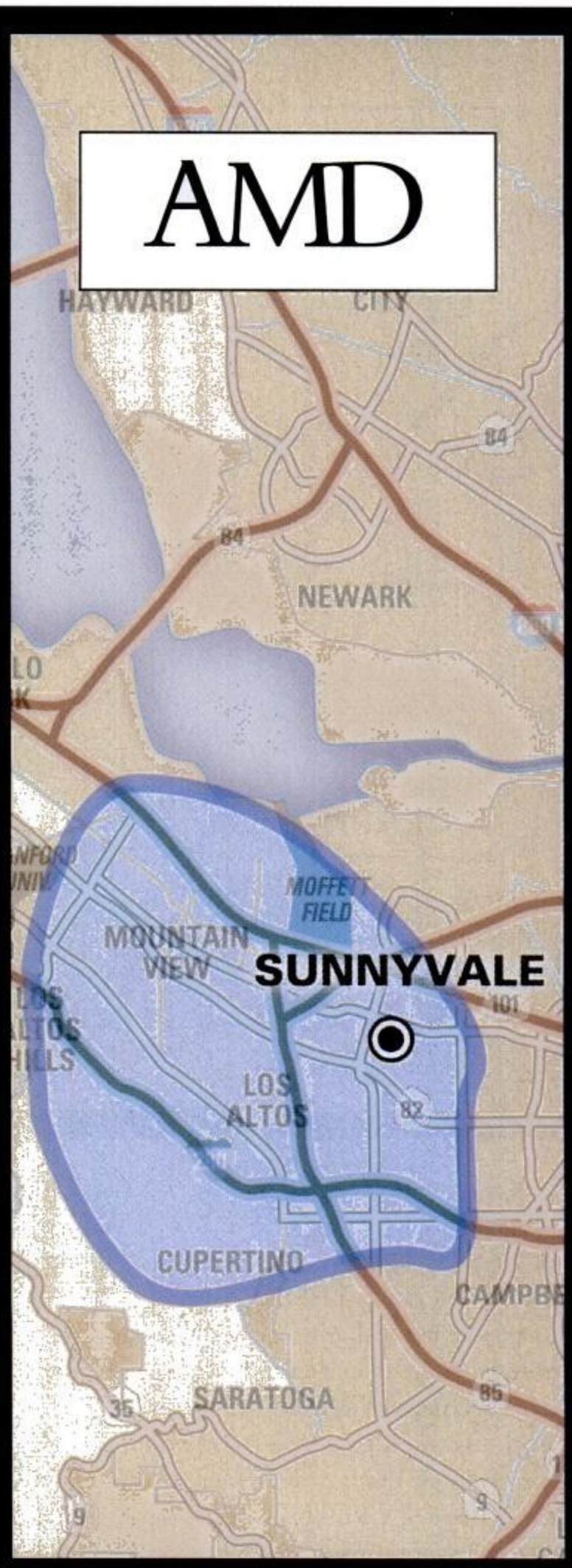
The Coppermine brandishes a smaller L2 cache than the Katmai, but because it's located directly in the CPU's brain (rather than off-chip on a common daughtercard), the cache can operate at the speed of the CPU core, mitigating its intrinsic size issues. In the wild, speed equals life! Despite some growing pains—such as being bred with sickly, i820-chipset motherboards that had to be recalled and destroyed shortly after their introduction to the wild—the Coppermine has proven itself a majestic animal. Who wouldn't admire a CPU that roams freely on the 133MHz system bus range? Strangely, the CPU's name is a misnomer—no copper flows through the Coppermine's bloodstream!

D	October 1999	I	Slot 1, Socket 370		
FQ	500–1000MHz	L2	256K on-die		
P	0.18-micron	L1	32K		
TC	28 million	DS	106mm²	V	1.6–1.8
CH	Intel 440BX, Intel 810/815, Intel 820, Intel 840, VIA Apollo Pro 133, ALi Aladdin Pro 4/5				

Celeron II Coppermine

Quickly adapting to a strong territorial challenge from AMD's own value line of Duron processors, the Celeron II added support for the multimedia-enhancing SSE instruction set and has been clocked at speeds up to 1100MHz. The Celeron II was also the first of its species to have been bred specifically for 100MHz motherboard system bus habitats, although it wasn't unheard of for earlier Celerons to thrive near or past such bus speeds.

D	April 2000	I	Socket 370		
FQ	533–1100 MHz	L2	128K on-die		
P	0.18-micron	L1	32K		
TC	7.5 million	DS	90-102mm²	V	1.5–1.75
CH	Intel 810/815, VIA Apollo Pro 133, ALi Aladdin Pro 4/5				



Pentium 4 Willamette

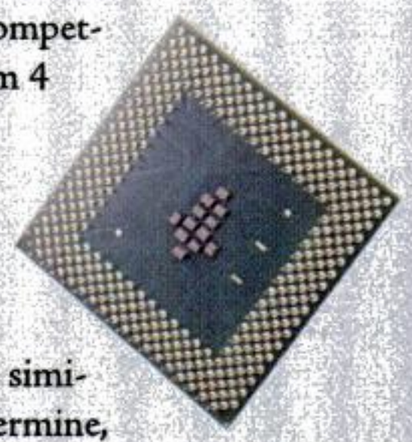
The P4's 20-stage pipeline and fast, on-die L2 cache make it well-equipped to dominate life in the valley. Its co-mingling with 400MHz system buses is completely unprecedented and presents tremendous opportunities for conservationists and commercial breeders alike. Furthermore, keen observers of the chip have recorded 144 new instructions, dubbed SSE2, including routines uniquely adapted for memory and cache management. Once exclusively associated with Rambus RDRAM memory, Willamette P4s have recently been observed in mating rituals with the more fertile and plentiful DDR SDRAM (don't blush—it's all perfectly natural). Intel enthusiasts admire P4s because they're so fleet of foot, but AMD breeders feel the CPU is all brute strength and lacks innate intelligence. Of course, who's "right" is quite irrelevant in the long run: Benchmarks make the final decision, and in today's PC ecosystem, benchmarks favor the fastest P4s.

D	November 2000	I	Socket 423 / 478**		
FQ	1400–2000MHz*	L2	256K on-die		
P	0.18-micron	L1	12K micro-op, 8K data		
TC	42 million	DS	217mm²	V	1.75
CH	Intel 850, VIA P4X266, SiS 645, ALi M1741				

*(and growing) **(1.9MHz and above)

Pentium III Tualatin

For all intents and purposes, this new breed of Pentium III is much like its evolutionary ancestors, but cut from copper, smaller-micron fabric. It seems Intel doesn't want the Tualatin competing with the Pentium 4 for scarce resources, and as a result, the CPU has effectively been consigned to laptop habitats. Despite its similarities to the Coppermine, the Tualatin is often incompatible with earlier Coppermine motherboard habitats because of its lighter thirst for power and certain species-specific chipset requirements. Nonetheless, the Pentium III Tualatin is a fierce creature and can beat many faster and tougher creatures, even though it's near the end of its evolutionary life.



D	August 2001	I	Socket 370		
FQ	1133–1200MHz*	L2	256K on-die		
P	0.13-micron	L1	32K		
TC	28 million	DS	81mm²	V	1.475
CH	Intel 815B, VIA Apollo Pro 133T/266T				

*(likely to grow)

LEGEND

- D — DATE INTRODUCED
- FQ — CORE FREQUENCIES
- P — PROCESS
- TC — TRANSISTOR COUNT
- CH — COMPATIBLE CHIPSETS
- I — CPU INTERFACE
- L2 — L2 CACHE
- L1 — L1 CACHE
- DS — DIE SIZE
- V — CORE VOLTAGE

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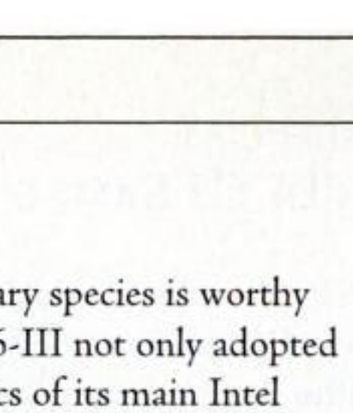
K6-III

A rare find, but this hoary species is worthy of great respect. The K6-III not only adopted the MMX characteristics of its main Intel predator, but also evolved its own unique set of instructions—3DNow!—to accelerate 3D gaming. Looking much like its K6-2 Pentium-clone cousin, but suddenly boasting on-die L2 cache, the K6-III can often be found nesting in laptops of the era, as well as in a number of Socket 7 desktops, which needed a new, more aggressive tenant. It must be noted that the discrete L2 cache soldered onto Socket 7 motherboards magically transformed into L3 cache when a K6-III was in the vicinity.



D	Spring 1999	I	Socket 7/Super 7		
FQ	400–450MHz	L2	256K on-die		
P	0.25-micron	L1	64K		
TC	21.3 million	DS	118mm²	V	2.1-2.5
CH	Sis 530, Ali Aladdin 5, VIA MVP3, VIA MVP4				

Athlon Classic

The Athlon Classic represented a coming-out party for what had heretofore been a threatened AMD nomenclature. With a completely revised pipeline built for high clock frequencies, a slew of floating-point units, and a symbiotic relationship with a 200MHz memory bus, the original Athlon was the first AMD CPU to seriously threaten Intel's desktop grazing zones. The new Athlon breed was also able to curb the worrisome problem of entire litters emerging stillborn from AMD fabrication plants—the new CPU was strong, hardy, and ready to meet all clock-speed expectations. The processor employed a 0.25-micron process for most of its reign, but just before the emergence of its Thunderbird progeny, the Classic Athlon moved to 0.18-micron, though even in this iteration, the proc still came with closely coupled L2 cache.

D	August 1999	I	Slot A		
FQ	500–850MHz	L2	512K closely coupled		
P	0.25-micron	L1	128K		
TC	22 million	DS	102mm²	V	1.5–1.65
CH	AMD 750, VIA KX-133				

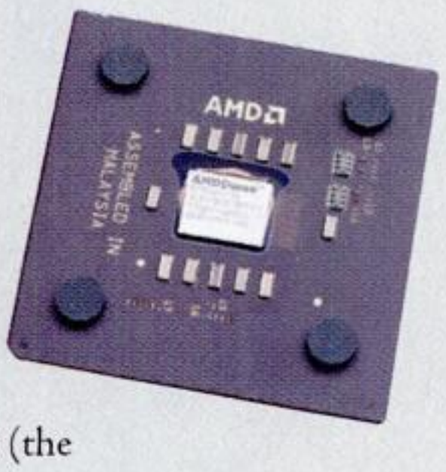
Athlon Thunderbird

Despite being named after a mythical bird, the Athlon Thunderbird is more of a hound dog—reliable, loyal, and easy to find. It differs from its Classic ancestors by employing a more efficient 0.18-micron process and moving L2 cache to the CPU die itself, where it runs at full speed. The species is noted for its affordability, its 200 and 266MHz frontside buses, DDR RAM support, and an unflinching willingness to work harder than the breeders intended. The stepping codes tattooed on the chips inform CPU spotters what gene pools the chips were taken from; AXIAR and AYHJA breeds are known to work as much as 550MHz over their official speed ratings. Alert: The latest Thunderbirds are branded with six-letter steppings, and the AYHJAR 1GHz chip is reported to run 600MHz faster than its rating, in some extreme cases. Truly, an example of nature's majesty.

D	June 2000	I	Slot A, Socket A		
FQ	750–1400MHz	L2	256K on-die		
P	0.18-micron	L1	128K		
TC	37 million	DS	120mm²	V	1.75
CH	AMD-760, Ali MAGIK 1, SiS 730S, VIA Apollo KT133A, KT266				

Duron Spitfire

The Spitfire shares its parentage with the Athlon Thunderbird, but its substantially lighter cache makes it less suitable for heavy lifting, so care should be taken before entrusting serious tasks to a Duron menagerie. The Duron is considerably hardier than the earlier AMD value breeds (the K6-2 and K6-III) and can puff out its chest to appear virtually indistinguishable from contemporary Athlons and Pentium IIIs of the era. Many amateur processorologists would incorrectly classify the Duron Spitfire in the same intelligence class as Celeron II Coppermine, but in clock-for-clock matches, the Duron Spitfire would easily outrun the latest Celeron.



D	June 2000	I	Socket A		
FQ	600–950MHz	L2	64K on-die		
P	0.18-micron	L1	128K		
TC	25 million	DS	100mm²	V	1.75
CH	AMD-760, Ali MAGIK 1, SiS 730S, VIA Apollo KT133A				

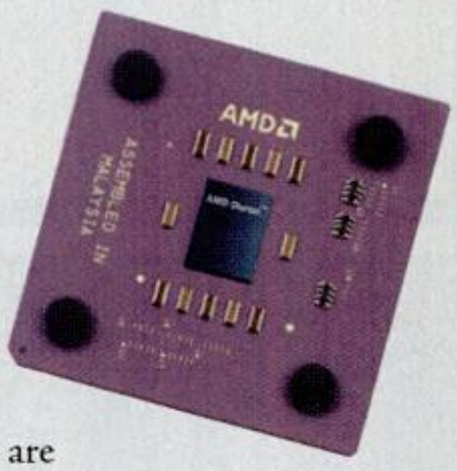
Athlon Palomino/XP

Take note: This latest Athlon breed has more than just new copper interconnects that allow it to run faster and consume less power—its brain has developed to include a data prefetch cache predictor and a translation look-aside buffer that help it make better use of its 384K of cache in fight-or-flight situations. The Athlon Palomino is also the first AMD breed to collaborate in multiprocessor habitats, although many anxious breeders may find multiproc motherboards expensive and rarefied for the time being. Chameleon-like, the Palomino has also learned to copy from its rivals in the wild, and now understands all of Intel's SSE instruction set.

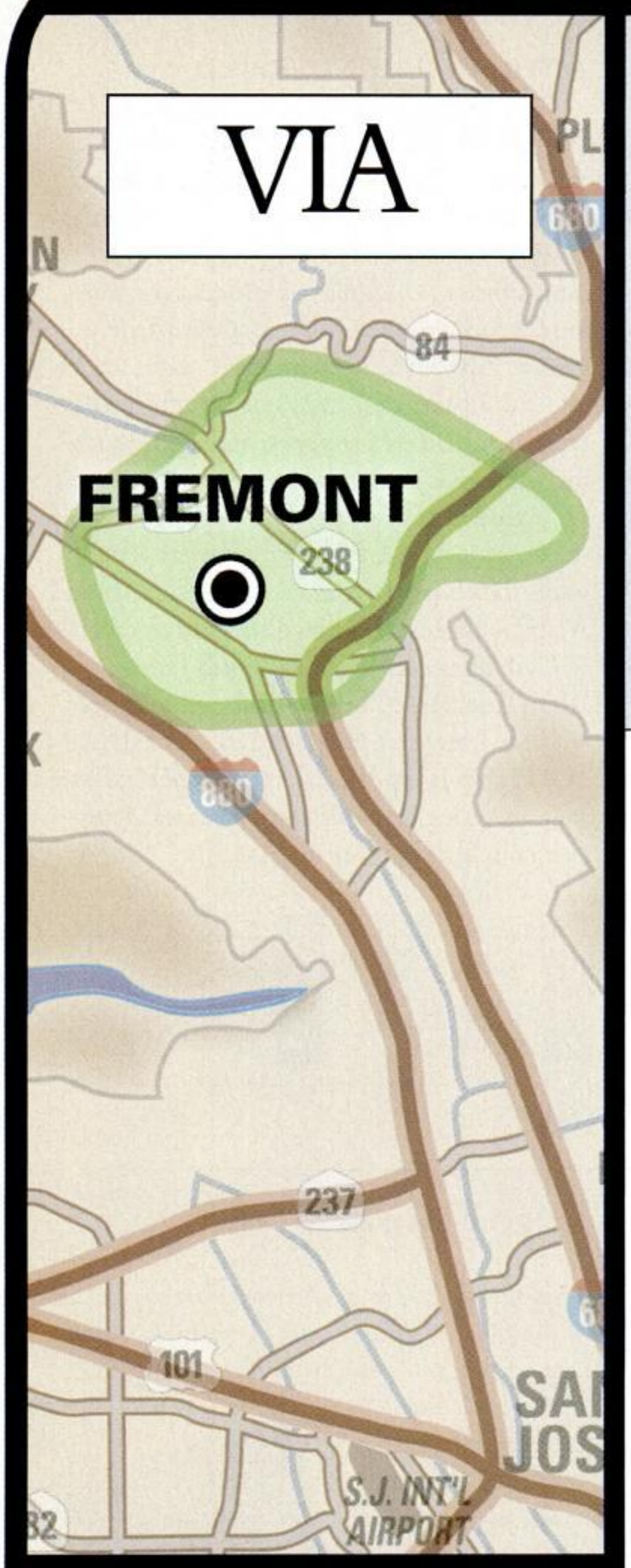
D	May 2001	I	Socket A		
FQ	1300–1533MHz	L2	256K on-die		
P	0.18-micron	L1	128K		
TC	37.5 million	DS	128mm²	V	1.75
CH	AMD-760, KT-266, VIA Apollo KT133A, VIA ProSavage KM133				

Duron Morgan

This species builds on the comfortable success of the Spitfire value breed, but experts warn that pricing pressures from its stronger Thunderbird and Palomino cousins have the Morgan cowering in the underbrush. Care and feeding costs for all these CPUs are so comparable, many nature lovers are wondering why anyone would want to domesticate the Morgan in the first place—it can't even mate with a 266MHz frontside bus, for the love of Pete! Note, however, that the Morgan has the full multimedia-enhancing SSE instruction set (through 3DNow! Professional), which never found its way into the Thunderbird and Spitfire stock.



D	August 2001	I	Socket A		
FQ	950–1100MHz	L2	64K on-die		
P	0.18-micron	L1	128K		
TC	25.2 million	DS	106mm²	V	1.75
CH	AMD-760, Ali MAGIK 1, SiS 730S, VIA Apollo KT133A, KT266				



VIA C3 Samuel 1

Conservationists have worried that some unsung breeds might disappear entirely out of neglect, but chipset breeder VIA decided to expand into CPUs, so it rescued the Cyrix and Centaur legacies from extinction. The C3 (formerly Cyrix III) is actually based on Centaur WinChip stock, although its limited cache makes it a liability in the wild.

D	June 2000	I	Socket 370		
FQ	500–750MHz	L2	none		
P	0.18-micron	L1	128K		
TC	11.3 million	DS	76mm²	V	1.8–2.0
CH	Intel 810/815, ALi M1651, VIA 693A + 596B, VIA PLE133 + 686A				

VIA C3 Samuel 2

VIA gave the C3 a significant hormone injection in the second Samuel core, affording it enough cache to survive and reducing its voracious appetite for voltage. VIA bred the C3 to inhabit the popular Socket 370 nests so the chip could easily begin populating discarded or otherwise neglected motherboard environments.

D	March 2001	I	Socket 370		
FQ	733–866MHz	L2	64K on-die		
P	0.15-micron	L1	128K		
TC	15.2 million	DS	52mm²	V	1.5–1.6
CH	Intel 810/815, ALi M1651, VIA 693A + 596B, VIA PLE133 + 686A				

VIA C3 Ezra

Even though VIA's geneticists cracked the gigahertz barrier and further weaned the C3's already light appetite, the C3 is still on the Extinction Watch List since it has not been widely accepted in most major wildlife habitats. Those hard hit by tough economic times may well find the C3 a worthwhile investment. A charming enclave can be built around a C3 with equipment rescued from an upgraded Pentium III or Celeron system, where this industrious processor will feel right at home.

D	August 2001	I	Socket 370		
FQ	800–1000MHz	L2	64K on-die		
P	0.13-micron	L1	128K		
TC	15.4 million	DS	72mm²	V	1.35
CH	Intel 810/815, ALi M1651, VIA 693A + 596B, VIA PLE133 + 686A				

VIA C3 Nehemiah

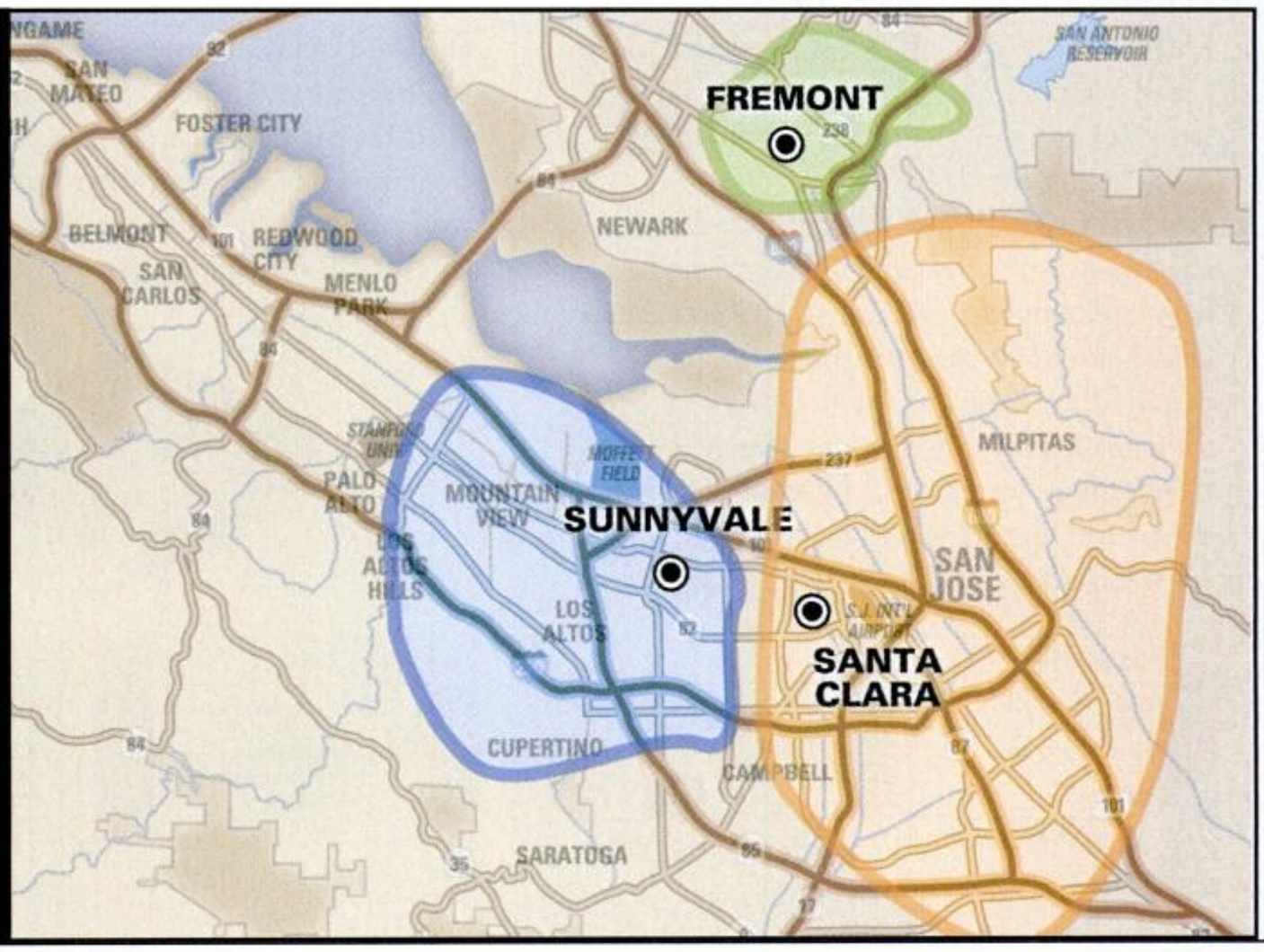
After being rescued from extinction, the C3 seems ready to evolve modestly, moving to a 0.13-micron process, growing a modern cache, adopting the SSE multimedia instruction set for greater graphics visualization, and continuing to push into gigahertz-plus speeds. We're certain it dwells in the Socket 370 nest. Still, there is much we don't know about the mysterious and elusive C3.

D	late 2001–early 2002	I	Socket 370		
FQ	900–1200 MHz	L2	256K on-die		
P	0.13-micron	L1	128K		
TC	TBA	DS	TBA	V	TBA
CH	Intel 810/815, ALi M1651, VIA 693A + 596B, VIA PLE133 + 686A				

SILICON VALLEY

"Where the CPUs Roam"

It's been said there's no better place in the world to observe CPUs in their natural habitat than the San Francisco Bay Area, where they're not only vast in numbers but also in diversity. New varieties are discovered each month, making it nearly impossible to catalog them all. But ardent conservationists on the lookout for budding CPUs know that the three main species and their ilk can be found in the regions indicated by this map: VIA in the North, AMD to the West, and Intel in the Southwest.



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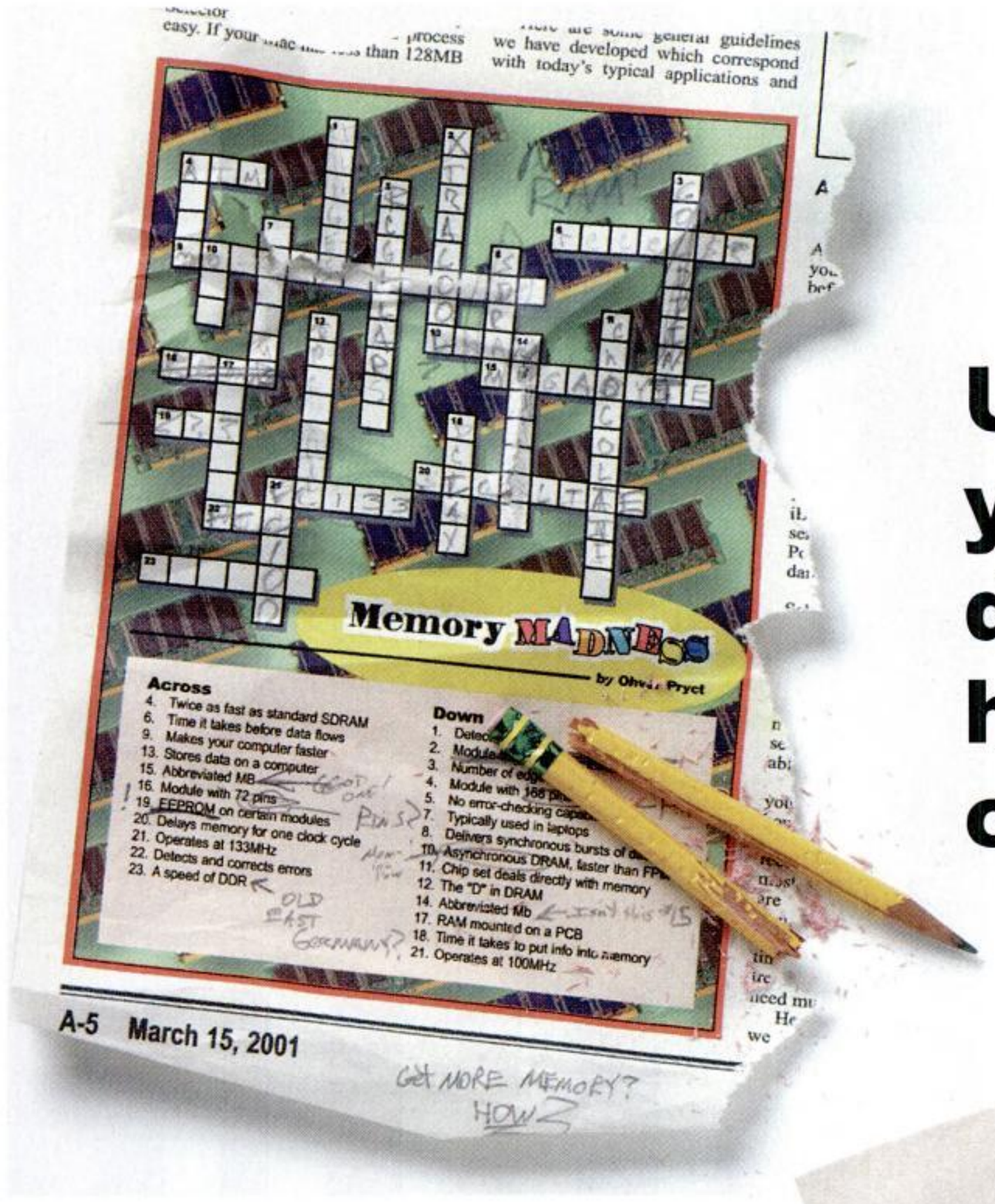

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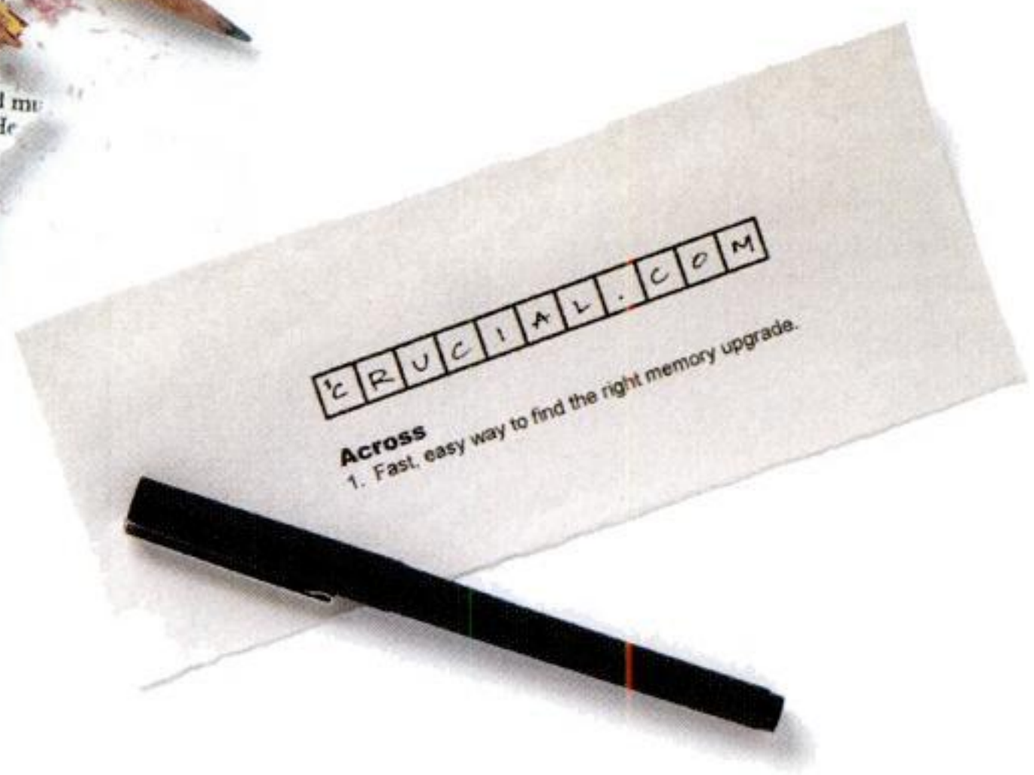

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WHICH PROCESSOR COMPANY WILL ENGINEER NEXT YEAR'S FASTEST CPUS? INTEL? AMD?

TOM HALFHILL FILLS US IN ON WHAT TO EXPECT FROM THE TWO MANUFACTURERS' DEVELOPMENT TEAMS AS THE CPU VENDORS FIGHT FOR DESKTOP DOMINANCE.

It's a clash of process technologies. It's a collision of architectures. It's the battle for...

CORE COMPETENCY

A REPORT FROM THE FRONTLINES OF THE CPU SHOWDOWN

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It seems like just yesterday microprocessors soared into the gigahertz stratosphere. But it was actually 18 months ago when AMD unleashed the first 1GHz Athlon. According to the popular interpretation of Moore's Law, microprocessor speeds should have doubled by now—and indeed they have. Intel rolled out a 2GHz Pentium 4 in August.

Coincidence? Luck? Nope. It's science! And you ain't seen nothin' yet.

Soon after Intel co-founder Gordon Moore observed in the 1960s that integrated circuits were doubling in density every 18 months, skeptics said his famous "law" would slam into a wall and expire. The pace just didn't seem sustainable. But engineers have been outsmarting the skeptics for three decades. Still, the drumbeat of pessimism seems to grow louder each year. Naysayers have been fretting about everything from the limits of printed-circuit optical lithography to the quantum misbehavior of subatomic particles. Meanwhile, engineers keep cranking out faster and faster chips—roughly twice as fast every 18 months.

Sure, it has to stop someday. But not soon. Motorola recently announced a new method of layering gallium arsenide on silicon to create superfast chips. And Intel has revealed its technology roadmap for the rest of the decade, confidently predicting at an industry conference that Moore's Law will remain solid until at least the year 2010.

"But what happens after 2010?" asked a reporter.

"We don't know," replied an engineer. "But that gives us nine more years to figure it out."

This is pretty much the same answer we've been hearing for 30 years. Just when it seems like Moore's Law can't possibly be pushed any further, somebody finds a way to keep it chugging along. Here's a sneak preview of the technologies that chipmakers like Intel and AMD will use to keep our dream machines screaming.

THE CPU PIPELINE

Two basic factors govern the performance of a microprocessor: architectural design and manufacturing technology. Chipmakers keep pushing forward on both fronts.

A chip's architectural design is akin to the layout of a new race-car engine—it's defined by the number of cylinders, the bore and stroke of the pistons, the configuration of the valves, and so on. Of course, anybody can draw fantastic plans, but they're worthless if the manufacturing technology can't meet the

challenge. A car engine that exceeds manufacturing constraints will overheat and fail. The same holds true for microprocessors.

AMD scored a big hit with its Athlon design in 1999. The Athlon pushed clock speeds to 1GHz and beyond, outrunning Intel's older Pentium III design. Intel fought back with the Pentium 4, which is now hitting clock speeds 25 to 33 percent faster than the Athlon. The P4 will probably maintain that lead until AMD introduces another next-generation design late in 2002.

What makes the P4 so swift is a feature Intel calls "hyperpipelining," more commonly known as superpipelining. In a CPU, a pipeline is like a factory assembly line—it executes program instructions one stage at a time. The more pipeline stages, the less time each stage needs to complete its work, so the faster the CPU can cycle. While most CPUs have four to seven stages, and the Athlon is considered a superpipelined CPU with 10 stages, the P4 has more than 20 stages. It's built to scream.

But superpipelines have drawbacks, which partly explains why a P4 doesn't always deliver more actual performance than a "slower" Athlon, according to some benchmarks. Clock frequency is not an absolute measure of performance. But clock frequency is a *general* measure of performance, and most PC buyers rarely pay attention to anything else. For that reason, AMD's next-generation design will almost certainly have a deeper superpipeline, as well as other features that aim for higher clock speeds.

One drawback of superpipelines is the penalty they impose when the CPU must branch to another part of the program. Like an assembly line that must stop to change the kind of vehicle it's manufacturing, a CPU pipeline must often pause to load a different stream of instructions. The deeper the pipeline, the greater the penalty during this changeover. Modern processors try to avoid that penalty by predicting branches and preloading the new instructions. If AMD's next-generation design has a deeper pipeline, it will probably have better branch prediction, too. For example, it might add more capacity to keep track of previous branches so it can more accurately predict future branches. The trade-offs are greater design complexity and higher power consumption, but the payoff is probably worth it.

THE 64-BIT QUESTION

AMD's next design will be the "Hammer" series, or x86-64 architecture. It's AMD's 64-bit extension of the 32-bit x86 CPU architecture that has ruled the roost since the 1980s, and it's a risky venture for AMD. Intel created the x86 architecture and is usually the only company that significantly changes it. AMD sees an opening because Intel is moving to an entirely different (but still x86-compatible) 64-bit architecture called IA-64—the high-end Itanium chip for servers is an IA-64 processor.

Just by itself, AMD's 64-bit architecture probably won't mean much to PC users. To take full advantage of it, vendors must recompile their software, and most of them probably won't bother. Also, Intel won't support x86-64, and typical desktop apps have little to gain from 64-bit processing. When push comes to shove, CPUs based on x86-64 will be much more useful for running server software, such as databases (AMD craves a larger share of the profitable server market). Recompiling software won't be mandatory, because x86-64 processors will run 32-bit software. For that reason, AMD plans to eventually phase out its 32-bit x86 processors.

IF AMD'S NEXT-GENERATION DESIGN HAS A DEEPER PIPELINE, IT WILL PROBABLY HAVE BETTER BRANCH PREDICTION, TOO.

Intel's next jump in architectural design will be simultaneous multithreading (SMT), which Intel calls "hyperthreading." This technique has been kicking around for years (see "Fast Forward," October 2001). SMT tries to squeeze out more performance by mixing together instructions from different programs or program "threads" in the same pipeline. Normally, a pipeline executes instructions from only one program or thread at a time. An SMT pipeline is like a single factory assembly line that manufactures passenger cars, pickup trucks, and minivans simultaneously.

Intel plans to combine SMT with a spooky technique called speculative execution, which is already used by the P4. Speculative execution allows CPUs to execute program instructions ahead of time, even before you strike a key or click your mouse, so that their results are immediately available if you choose the CPU's predicted path through a program.

For example, let's say you're deciding whether to click "OK" or "Cancel" in a print dialog. The CPU might predict you'll click "OK" and prepare to print the document while simultaneously performing other tasks in the background. The CPU even keeps track of your behavior so it can make better predictions in the future. If you're feeling contrary and click "Cancel," the CPU discards the speculative results—and notes your contrariness for its next prediction. CPUs can speculate and multitask today, but the dynamic duo of SMT and speculative execution will let them multitask faster, because mixing actual

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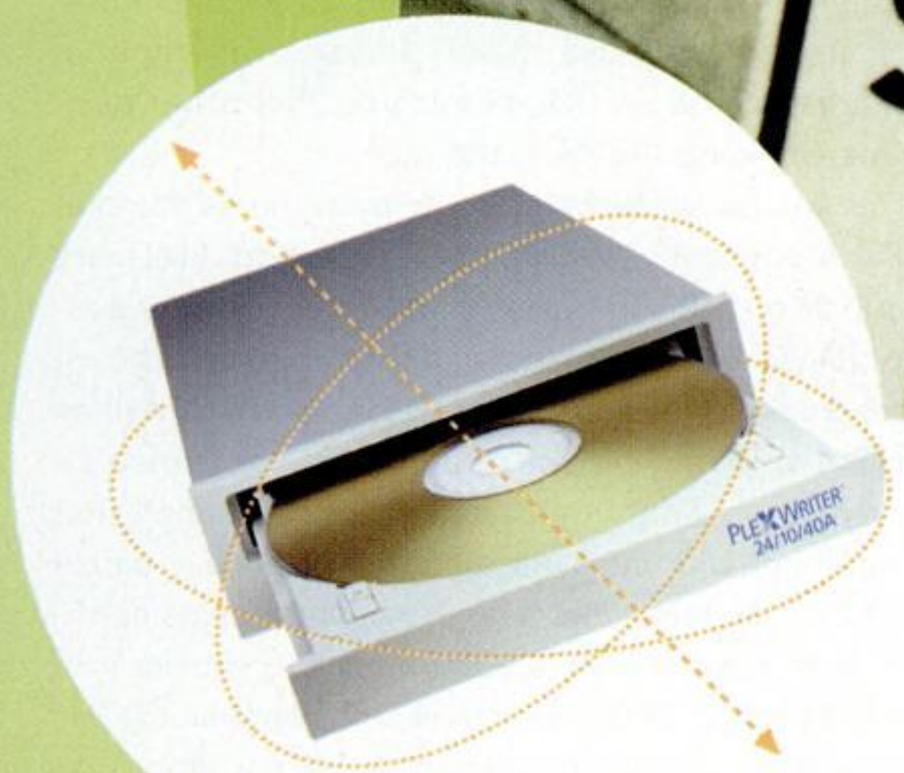

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threads and speculative threads together in the same pipeline uses the CPU's resources more efficiently.

Intel says SMT is especially good at accelerating pointer-intensive software, including databases and anything written in object-oriented programming languages, such as Java and Microsoft's new C#. Few desktop apps are written in Java, but it's popular for server software. C# is Microsoft's language of the future—it will gradually displace C++ in Microsoft apps (see this month's "Fast Forward," page 13).

One design feature to expect from both Intel and AMD is larger on-chip caches. This is a no-brainer consequence of Moore's Law, which actually describes the progress of integrated circuits in terms of density, not frequency. Every 18 to 24 months, the number of transistors that fits on a chip roughly doubles. Engineers love to use those extra transistors for more advanced architectural designs, but they're having trouble keeping up. It's easier to make larger caches, because caches are fairly simple memory arrays of transistors.

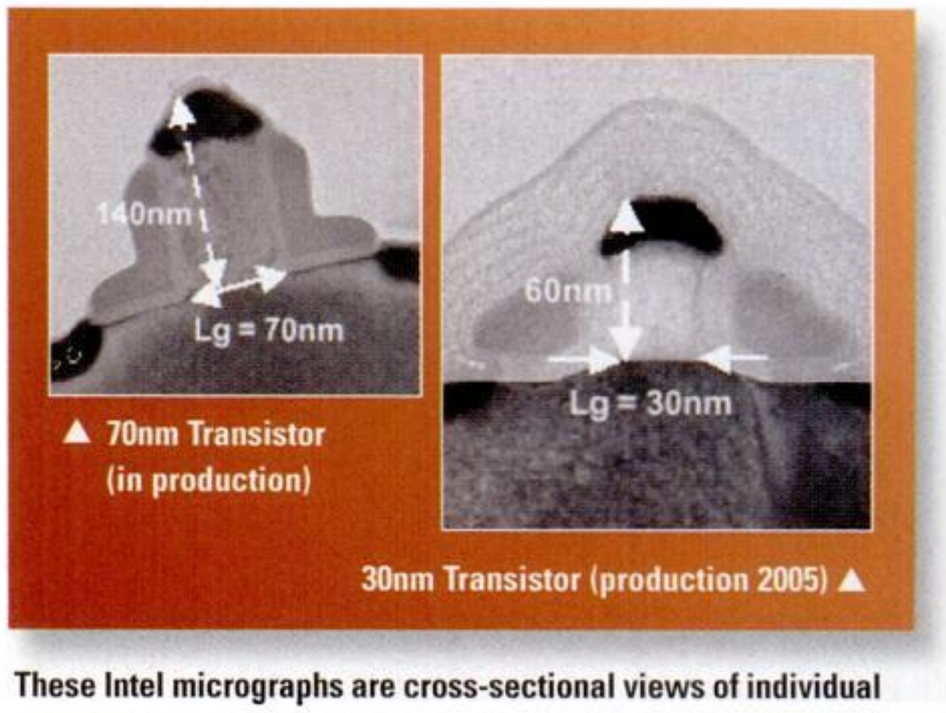
Caches also help lighten the heaviest ball and chain on modern CPUs: main memory (RAM) that can't keep up with CPU speeds (see "Fast Forward," August 2001). Watch for on-chip L1 and L2 caches to keep growing, and for on-chip L3 caches to become commonplace. We'll also see more innovative cache designs, such as the P4's trace cache, which loads more instructions from memory before the CPU needs them.

SIZE MATTERS

Architectural design is inevitably driven by process (manufacturing) technology. Process technology determines how many transistors will fit on a chip, how fast the transistors switch on and off, and how far the electrical signals must travel from one part of a chip to another. In this realm, smaller is better. Smaller transistors can switch faster and burn less power, and shorter wires can carry signals to their destinations more quickly.

What's amazing about the new 2GHz P4 isn't only its speed, but that Intel reached 2GHz by manufacturing the P4 with 0.18-micron circuits and aluminum wires. Nowadays, that's trailing-edge process technology. AMD has been using lower-resistance copper wires since rolling out the "Thunderbird" Athlon last year. This summer, Intel introduced its first CPU (a mobile Pentium III) with 0.13-micron copper wires. Intel is moving the P4 to this new process, which will rapidly boost clock speeds to 3GHz and beyond.

Next year, AMD will fight back with 0.13-micron technology in its Athlon-family "Thoroughbred" and "Appaloosa" processors. Later in 2002, AMD will try to leapfrog Intel by adding another twist: silicon-on-insulator (SOI) transistors. SOI is a manufacturing technique that reduces transistor capacitance. Result: The faster-switching transistors enable higher clock frequencies and lower power consumption. Intel lags behind on SOI, but argues that other techniques will keep the P4 in the race.



These Intel micrographs are cross-sectional views of individual transistors, with measurements in nanometers (1nm = 1 billionth of a meter; a human hair is about 100,000nm thick). Intel is already producing the 70nm transistor in a new 0.13-micron process. The 30nm transistor is scheduled for production in 2005, and a 20nm transistor is scheduled for 2007. These dimensions refer to Lg, the transistor's gate length.

One of these techniques is extreme ultraviolet (EUV) lithography, which both Intel and AMD are developing. EUV lithography uses very short-wavelength light to etch circuits on a chip. Intel has shown micrographs of experimental transistors as small as a strand of DNA. At those dimensions, some insulating layers are only three atoms thick—so small that quantum effects such as electron tunneling cause the circuits to leak electricity. However, Intel is confident that it can move a 0.045-micron process into production by 2007, which would enable 20GHz CPUs with a billion transistors (a P4 has about 42 million transistors). Intel's target for 2010: a 0.003-micron process, boosting clock speeds beyond 30GHz. AMD is staying in the race, too, licensing technology when necessary from the likes of IBM and Motorola.

The bottom line: Even without any whiz-bang breakthroughs, the architectural designs and process technologies already in the labs will allow microprocessors to continue evolving at their historic pace for the rest of the decade. That's great news if you're a speed phreak. Or a sloppy programmer. What happens after 2010 is anybody's guess. But as the engineers say, they've got nine years to work it out. ■

Besides being a columnist for* Maximum PC *since its inaugural issue, Tom Halfhill was a senior editor at* Byte *magazine and an analyst for the* Microprocessor Report, *the leading journalistic authority on chip architectures and process technologies.

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DAY OF DEFEAT

During the past couple of years, the underground scene for *Half-Life* has been growing as quickly as *Quake*'s did in its boomtown days, with a huge community of enterprising mod-makers who seem to have something new for us to play every couple of weeks. The latest—and perhaps most addictive—mod is *Day of Defeat*, a World War II–themed conversion that offers a staggering mix of original teamplay, great maps, well-balanced weapons, and fiendish tactics all set against a historical backdrop that's dripping with *Saving Private Ryan*–style atmosphere.

"The experience is full of emotion," says Allan "Metaljacket" O'Sullivan, a veteran Day of Defeatist who plays with the Canadian clan CdN. "Fear is an aspect very few mods have been able to incorporate, but *Day of Defeat* makes you want to actually fight to stay alive."

The game is currently in beta version 1.3b, although a revamped version 2.0 promising new weapons and a whole raft of other additions (including a single-player mode) is due soon. Get started at **www.dayofdefeatmod.com** and remember that since this is an add-on, you'll need the retail version of *Half-Life* to play.

KEY FEATURE

The sniper rifles. *Day of Defeat*'s keenly accurate long-scope rifles challenge traditional FPS notions about "camping": Just a single sharpshooter, well-hidden and carefully placed at a critical choke point, can be the deciding tactical element in an otherwise deadlocked game. For the full *Private Ryan* experience, try reciting Bible verse as you pick off those hapless Nazis one by one.

QUAKE

The plain fact of the matter is this: The original *Quake* remains the multiplayer game of choice for many hardcore FPS aficionados, despite its succession by two technically superior sequels. Checking in on a Tuesday mid-morning, there were literally hundreds of "classic" *Quake* games in progress.

So how does *Quake* remain popular after five years in one of the fiercest and fastest-evolving genres in PC gaming? There may be a slight nostalgia factor at work, but serious Quakers will tell you that the groundbreaking game's razor-sharp combination of pace, weaponry, and level design has never been topped.

"Nothing compares to the ol' *Quake* gaming," says "Lanky," a long-term *Quake* vet and member of the Midwest-based la Clan. "The fast pace, absence of lag, and great layout of maps make for awesome gameplay."

So what are you waiting for? Dig out that old copy of *Quake* and head on over to **www.planetquake.com** to dive into the community and begin downloading the latest maps and mods (the most popular is MegaTF, which can be found at **www.megatf.net**).

KEY FEATURE

D3DQuake. You didn't just lay out $3,000 for that state-of-the-art Alienware rig to play a game that's five years behind the technology curve, did you? Perhaps not—and that's where *D3DQuake* comes in. While the original OpenGL-accelerated version of *Quake* can't hold a candle to *Quake III* or *Unreal Tournament* as far as graphics go, you might be surprised by just how great it can look, thanks to the recent creation of *D3DQuake*, a shareware program that modifies *Quake* to run on any Direct3D-compatible card. All the files you need can be found at **www.palevich.com/3d/d3dquake/**. Do yourself a favor and rediscover why, in this case, the original really is still the best.

MAJESTIC

Majestic may be online, but is it really a multiplayer game? Perhaps not in the traditional sense, but then again, *Majestic* is redefining conventional ideas about online gaming in more ways than one. Sending you clues via a skillfully woven combination of e-mail, web links, instant messaging, late-night phone calls, faxes, and video, *Majestic* puts you at the center of an interactive, episodic story about a shadowy government conspiracy.

While the game doesn't require players to interact with each other to make progress, it does encourage it via the "Majestic Alliance," an ever-present desktop interface that allows large groups of players to communicate with each other via *AOL Instant Messenger*. The Majestic Alliance has already grown beyond the initial expectations of the game designers, with die-hard players creating their own web sites, fan fiction, and other elements—some of which are now being incorporated into the game proper. "Imagine being an *X-Files* fan and writing some fan fiction, then seeing that fiction woven into an episode of the show," says *Majestic* co-creator Neil Young. "That's the kind of involvement *Majestic* players can have."

All this, and *Majestic* is still in its infancy. While the designers have two full seasons of story arc mapped out, the second episode has just recently gone live. You can download the software you'll need and check out the free pilot episode of *Majestic* by visiting **www.majestic.ea.com**. This introductory segment will give you a fairly easy ride, as it introduces you to the unique mechanics of the game. But as Young reveals: "Starting with episode two, we're really beginning to ramp up the difficulty and the complexity of the story for the more hardcore players."

KEY FEATURE

The Majestic Alliance. At any point, you can see who else is online and how far they've progressed in the story—so even if you don't want to get into the heavy-duty role-playing aspects of the game, you can still hit up fellow players for hints when you're stuck on a particular puzzle.

SUBSPACE

On first examination, *Subspace* is little more than a fancied-up version of *Asteroids*, featuring tiddly sprite-based 2D graphics, simplistic keyboard controls, and explosions that look like a damp match going off. So why bother?

Because *Subspace*'s charms are all in its gameplay. While the essential mechanics of rotate-and-thrust ship control are extremely simple, a multitude of different ship types, weapons, power-ups, levels, rules, and team tactics guarantees there's always something new to learn. The game's regular player base is relatively small at around 20,000, but they're 20,000 of the most hardcore gamers you'll find online. Just check out some of the community sites (such as **www.subspace.net**, **www.subspacehq.net**, and **www.subspacezone.net**) for a glimpse of how dedicated these players are.

"*Subspace* is the most addictive and fascinating game I've ever played," says "V-Chip," a veteran squad flyer and head referee in *Subspace*'s Star Warzone League. "Most people are initially disappointed with what they see," says V-Chip, "so our biggest problem is getting them dedicated enough to play for a month or two. After that, you can barely beat them away with a large trout."

KEY FEATURE

The heart and soul of *Subspace* is the fan community itself. When Virgin Interactive, the game's original developer, shut down its online servers in 1998, a group of hardcore fans banded together and created the *Subspace* Council to ensure the game's survival. They've gone so far as to create from scratch a whole new version of Subspace called *Continuum*, which they hope will represent the long-term future of the game and its community. Grab the latest version of *Continuum* from the downloads page at **www.sscouncil.net**.

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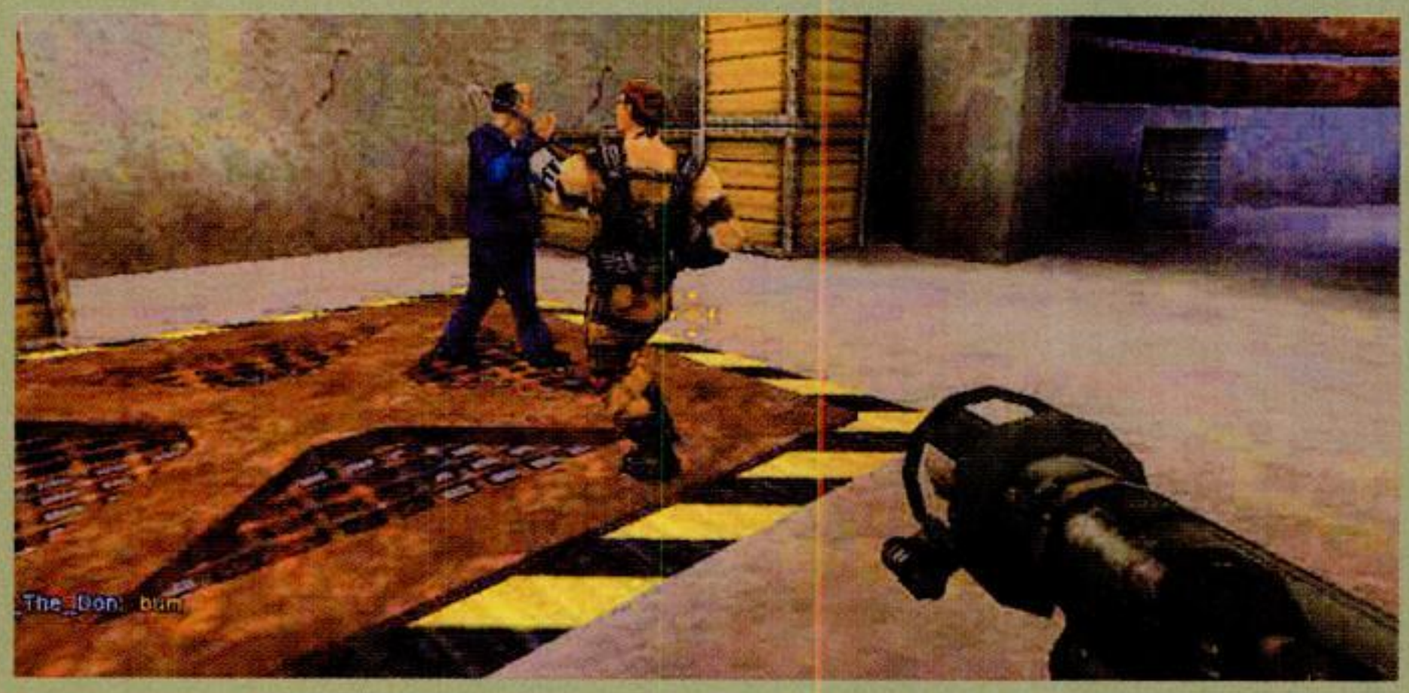
TEAM FORTRESS CLASSIC: THE HUNTED

Every self-respecting *Half-Life* player knows about *Team Fortress Classic*. It's the user-created mod that went from humble beginnings to a slot in Sierra's *Half-Life Game of the Year Edition* bundle. *TFC* also helped its principal designers land jobs at Valve, the original *Half-Life* development house (they're now working on the eagerly awaited *Team Fortress 2*). There's a wide variety of game types and maps within *TFC*, but what really sets this mod apart is The Hunted, a brilliantly original game type that assigns a team of rocket launcher- and machine gun-toting bodyguards to shepherd a defenseless "El Presidente" character through a deadly maze of alleyways, ruined buildings, courtyards and corridors. You must reach an escape point before a rival team of snipers blows your charge's head off. It's perhaps the most electrifying and nerve-wracking of all *Half-Life* mods, especially for the bodyguards as they get to within inches of "delivering the package" only to see that fateful red laser dot appear on the back of the Prez's head.

"I can say without reservation The Hunted is the best game I have ever played," says Elliot "TheRoost" Zastrow, who runs the immensely popular Got Hunted? server out of the UW-Madison college of engineering. "After falling in love with it, I soon found myself part of a community based on this one map. Hell, we don't even call it *TFC* anymore. You'll hear us say 'Hey, what time do you want to play Hunted tonight?'"

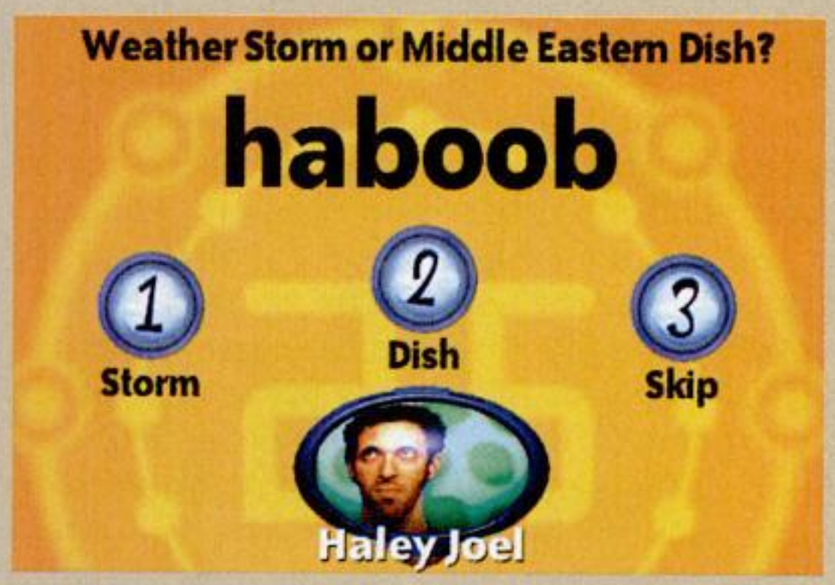


The Hunted has undergone some serious tweaking over the past couple years, so players should always be aware of specific changes and rules before they jump in. Got Hunted?, for example, incorporates protected areas that prevent unscrupulous players from camping around respawn points. Download *Team Fortress* from **www.sierrastudios.com/games/tf1.5/**, and find out more about Got Hunted? at **http://gothunted.elitehunters.com.**

KEY FEATURE

Teamwork. Unlike most team-oriented mods that will withstand a fair amount of maverick play, success in The Hunted is nearly impossible without an organized game plan and communication among players. "It almost forces people to play as a team," says longtime Hunted player and Got Hunted? regular Kit Pfeffer.

YOU DON'T KNOW JACK: 5TH DEMENTIA



KEY FEATURE

Wry humor has always separated *Jack* from the rest of the trivia crowd, and that's never been more important than in the online arena, where bland, soulless trivia games are a dime-a-dozen at virtually every gaming portal.

Of course, we all know about *You Don't Know Jack*—it's been a hardy perennial on the gaming scene since 1993, thanks to its fast-paced, manic, and, yes, genuinely funny reinvention of the trivia game, that most typically dull of all computer gaming genres. But perhaps you don't all remember the *You Don't Know Jack Netshow*, a short-lived, web-only extension of the franchise that gave players their twice-weekly fix of trivia. Of course, it was supported by an advertising-based business model, and none of us need to be reminded of what happened to such endeavors. Suffice it to say, *Netshow* went the way of the dodo before developer Jellyvision could take it to the next stage and provide online opponent-matching so there would always be somebody to play against.

They finally got around to delivering opponent-matching this past year with *You Don't Know Jack: 5th Dementia*, which allows opponents to challenge each other via a seamless (and free!) online system. The response from the strange little community of hardcore *YDKJ* fans has been huge. "The online play is awesome because pathetic morons who do nothing but play trivia games all day, like me, can finally be pathetic together," chimes "Little Cookie," who runs his own *YDKJ* fansite at **http://dmpm.tripod.com/Jacksite/**. Serious players can even take part in the leagues and worldwide high-score tables that have cropped up in the wake of *Jack*'s online rebirth. Grab a $20 boxed copy to get started, and get the latest Jacknews from the official site at **www.ydkj.com**.

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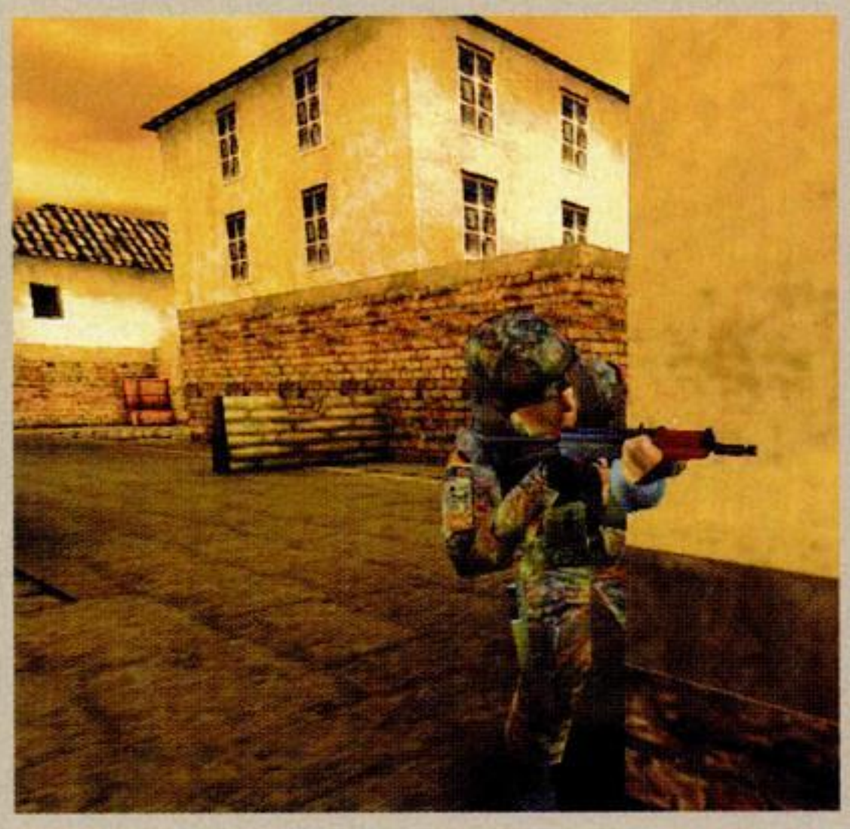
INFILTRATION

Unreal Tournament may have been eclipsed by chief rivals *Quake III* and *Half-Life*, but the game still boasts a diamond-hard core of dedicated mod-makers and players. That's partly due to how easy it is for gamers to create their own content with the UnrealEd tool. But the imagination and initiative of *UT*'s fan base has been even more integral to the game's longevity. "*Unreal Tournament* would not have sold nearly two million copies if it did not have support from the community," says *UT*'s lead designer Cliff Bleszinski. "We ship the very same tools that we used to build the game, and folks use these tools to realize their own visions of first-person action."

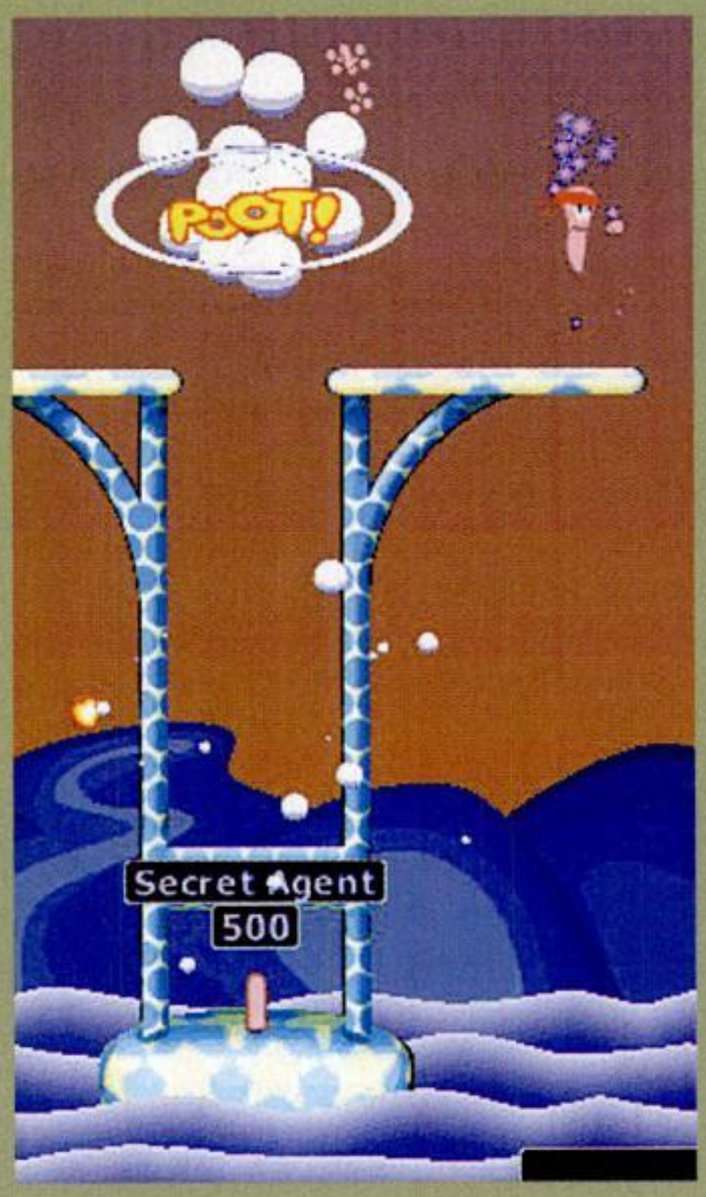
Bleszinski has been a tireless supporter of the *UT* mod-making community, regularly highlighting user-created work on his web site, CliffyB's Ownage (**www.planetunreal.com/cliffyb**). His favorite mod is Sentry Studios' *Infiltration*, a total conversion that mixes the beauty of the *Unreal* engine with the slow-paced, tactical, realism-based gameplay of *Rainbow Six*. Forget about using those handy computerized crosshairs that most FPS games provide—here you aim using the real metal gunsights mounted on your weapons. Similarly, body damage, recoils, and reload times are more realistic than in any other first-person actioner. "The realism is some of the best I've ever seen," says Phillip "Darmok8" Holley, an armed services veteran and leader of the LOF (Lethal Old Farts) clan. The latest version of *Infiltration*, v2.86, just went live over at **www.planetunreal.com/infiltration**.



KEY FEATURES

The arsenal. *Infiltration* began as a weapons mod, and its huge life-like arsenal of pistols, shotguns, submachine guns, and rifles remains at the heart of what makes this game special, with more guns and ammunition types planned for future releases. Check out the "Armory" page of the *Infiltration* web site for a glimpse of the toys you'll get to play with.

WORMS WORLD PARTY



KEY FEATURE

Customizability. Because the game is so simple, at least from a technical standpoint, and the tools so flexible, virtually anybody can try his hand at making mods. The range of user-created custom jobs reflects that—check out the world of *Worms* at **www.globalworming.net**.

If you've never played any of the *Worms* games before, this could be the single-most important magazine article you've ever read. This comical creation from little-known English development house Team 17 ranks as one of the most fun—and most underappreciated—PC games ever made.

Essentially, *Worms* is a turn-based strategy game in which teams of the angry little critters use a huge arsenal of outlandish weapons (everything from shotguns and mortars to crazed sheep, ninja death kicks, and the dreaded Holy Hand Grenade) to blast enemies off the landscape. "*Worms* can be played on a number of levels, with countless strategies," says Team 17 Creative Director Martyn Brown. "It's practically impossible to master, yet it's possible to get very, very good—but never so much that you can't be beaten." Long-time Wormer Peter "Illbeback" Hendrix agrees. "You can learn the basics in an hour," he says, "but it takes years to find out everything, if that's even possible at all."

The release of the latest addition to the series, *Worms World Party*, has added a mission editor utility so the fast-growing online community can create its own mods. The game's built-in *Wormnet* software allows for seamless online play, but you don't need to go online to enjoy the best its multiplayer mode has to offer. "It's fine killing worms online," says Brown, "but face-to-face is the best way to party."

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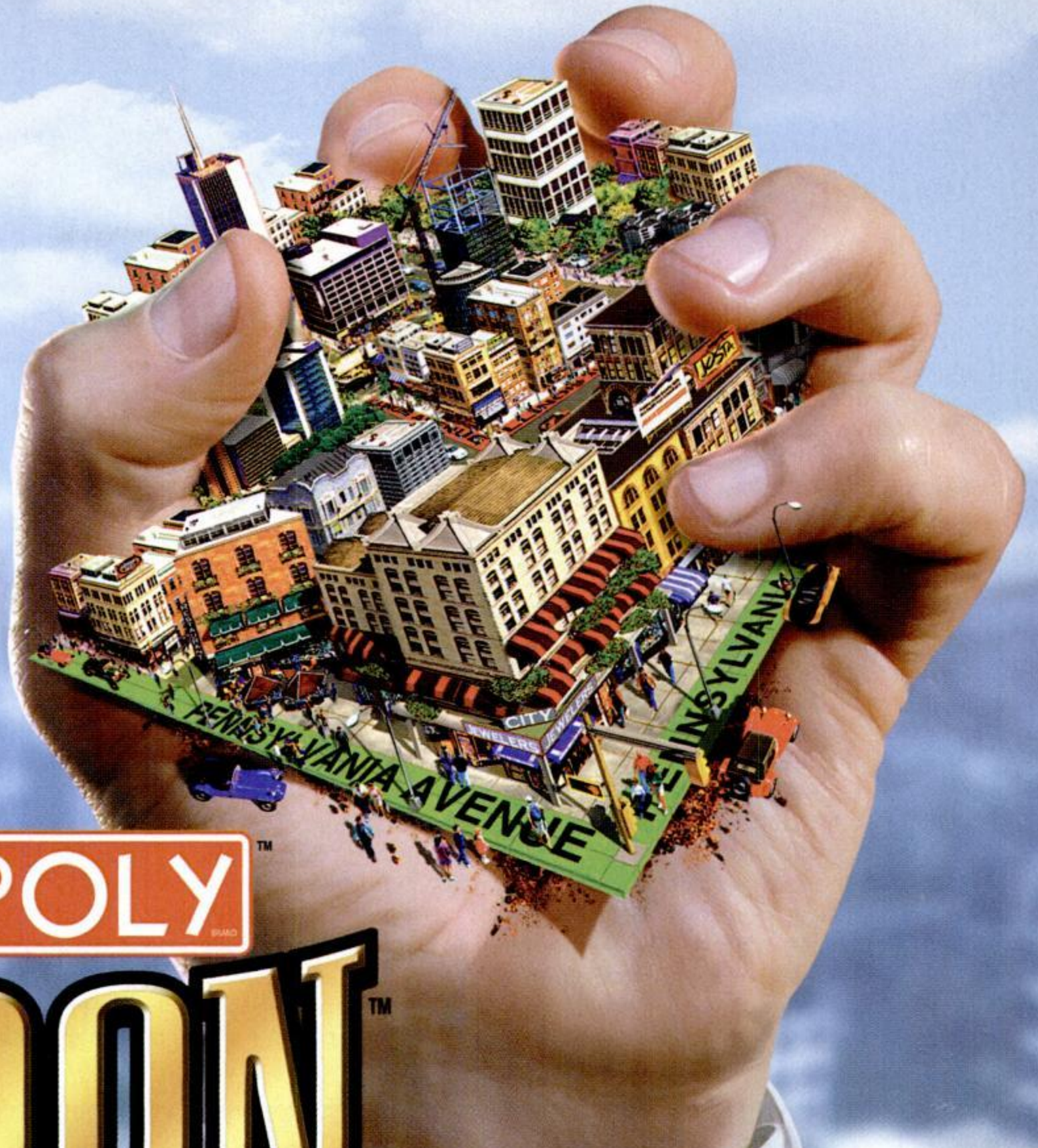

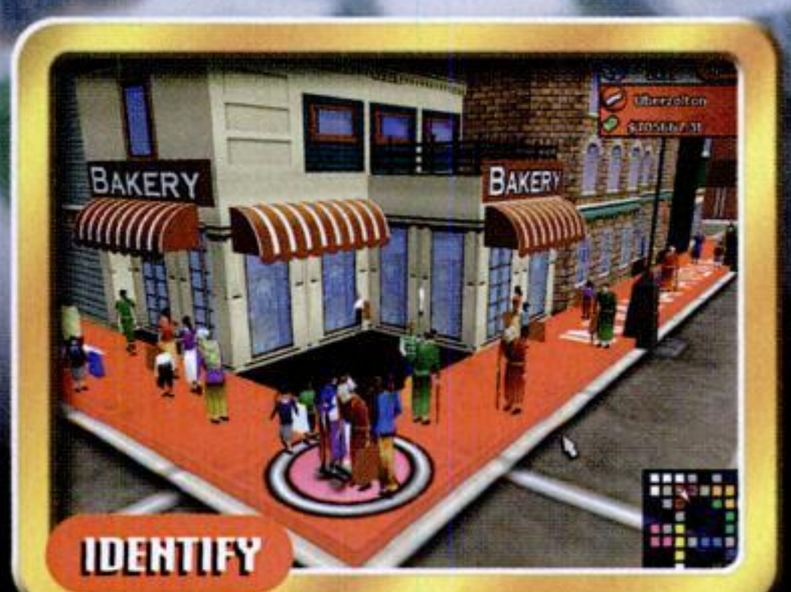

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WEAPONS FACTORY ARENA

When *Quake III Arena* debuted, players everywhere were blown away by the amazing graphics and breakneck speed, but disappointed that a game focusing on multiplay included so few (and such unimaginative) game options. The follow-up *Team Arena* retail pack would eventually go beyond simple deathmatch and capture-the-flag play, but the fervent online community was hardly going to sit back and wait around for that. And so the *Quake III* mod explosion began, and by this point, it should come as no surprise to learn that many of these "amateur" efforts have gone on to leave *Team Arena* choking in their dust.

Chief among them is *Weapons Factory Arena*, a *Team Fortress*–style mod that adds an entirely new arsenal (including a sniper rifle, flamethrower, and proximity grenades), as well as nine distinct character classes, each with its own special skills, strengths, and weaknesses. If you're looking for a more involved, tactical style of play without sacrificing the intense speed and balls-to-the-wall feel that *Quake* does best, *Weapons Factory Arena* is the way to go. "*WFA* was a whole new concept for many of us 'general' *Quake* players," says Ray "YourDaddy" Mayfield, who became so hooked on *WFA* after downloading an early version that he eventually joined the development team as its official webmaster. "Most newbies were used to standard deathmatch. Now, suddenly, you could grapple around a map, play a sniper and pick off people hundreds of yards away, become invisible and sneak into an enemy base, or better yet, disguise yourself as one of them. There is no other mod out there that can offer you the classes or the weapons that *WFA* can."

KEY FEATURE

Difficulty. *Weapons Factory Arena* is not for everyone—its long learning curve and complex key configurations make it best suited to experienced players, or at least those with enough patience to learn a whole new way to play *Quake III*. "*Weapons Factory* refines the more complex skills, which is probably why many players quit in their first week," says TJ "Penguinisto" Miller, who is currently working on the *Unreal Tournament* version of *WFA* (check it out: **www.planetunreal.com/weaponsfactory**).

WARBIRDS

KEY FEATURE

The squadrons. As you might expect, *WarBirds* players can be a hardcore bunch indeed, with tightly knit squadrons that can boast of long histories together. The Flying Pigs (motto: "Oink! Oink! To War!"), for example, have been flying together ever since 1995, when *WarBirds* was still in beta-test. Just as in real life, lone combat pilots won't survive in the air for long, so you'll need to find some reliable wingmen as soon as possible.

While most PC gaming genres have benefited from the Internet gaming boom, the once-mighty flight sim has been left lagging way behind its online potential. The recent demise of Jane's and its "World War" system put an end to the last major effort to make the huge electronic battlefield a reality, but serious online flyers know that there's always *WarBirds*, an online-only, massively multiplayer WWII combat sim that, while less ambitious than some of the grander (and failed) e-battlefield experiments, currently provides the best bang for your online dogfighting buck.

Players who sign up for *WarBirds* affiliate themselves with one of four different countries, and preferably a squadron, before entering the online arenas to dogfight with live enemies and bomb hostile targets. The good news—particularly for novices who are normally put off by the complexity of most sims—is that the various arenas offer different flight models and difficulty levels, so players can always find one to suit their skill level. The community even offers regularly scheduled training sessions led by volunteer flight instructors (usually experienced squadron flyers who may also be scouting for new talent).

You can get started with *WarBirds III* (the latest version) by downloading the software at **www.iencentral.com/warbirds**. Accounts cost $9.95 and $24.95 per month for limited and unlimited play, respectively, with free introductory months occasionally offered. ■

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Ask the Doctor

Symptom → Diagnosis → Cure

Have a burning PC problem? How about a burning PC sensation? We're more than happy to help you with your PC problems, but you might want to get that sensation thing checked out by a qualified sensation checker-outer. If you have PC questions, send them to doctor@maximumpc.com. Just remember: We can't answer every e-mail. Oh, *no*—not by a long shot.

Stupid Disk Image Tricks

I just put together a new system with a Tyan 2390B motherboard, an 850MHz Athlon, 256MB of Micron SDRAM, an ATI Radeon 64 SDRAM videocard, and a 20GB Maxtor hard drive containing a cloned image of my previous Win98SE OS. Every time I start it up, the system locks up. I have disabled all of my power-saving options and screensavers and have also disabled all of my startup items in msconfig. If I start the machine in Safe Mode, it won't freeze on me, but it does freeze in regular mode. What am I doing wrong? Help me!

—JASON BOWMAN

"While imaging your drive is great for backing up data and easing the pain of system reinstallation, it can't work miracles."

While imaging your drive is great for backing up data and easing the pain of system reinstallation, it can't work miracles—and you're asking it to work miracles. Because your drive image contains all the drivers and Registry information of the PC it was created on, when you dump that image into a new PC, your box will become confused. The software in your OS won't recognize the hardware in your case. In fact, it will think every single piece of hardware has been changed in between reboots. Hence your lock-ups.

You can attempt to repair the mess by downloading current drivers for all your hardware (including the network card or modem, motherboard chipset, and graphics card), then deleting the HKEY_LOCAL_MACHINE/ENUM folder (and all folders underneath it) from your Registry. After you reboot, reinstall the drivers for all your hardware. Everything should work better afterward. Or maybe not—so don't come griping to us if this operation totally borks your system. Your best bet is to clone the image of your old drive to a spare hard drive, then do a clean install of Windows 98 on the new PC, then grab whatever files you need from the original drive image.

Dick's a Dumbass Too

After seeing Dick Mathews' column in the September issue, I downloaded and ran *IEradicator*. Everything appears to be fine with *Internet Explorer*, but when I go to connect to the Windows Update site to have my programs reviewed for new updates, I get a web page telling me that my IT department has decided that all updates must come through it and I'm unable to connect to the Update page. I have just a single PC in my home, and I'm not connected with anybody, nor do I have an IT department. How do I get back access to Windows Update?

—STU WRIGHT

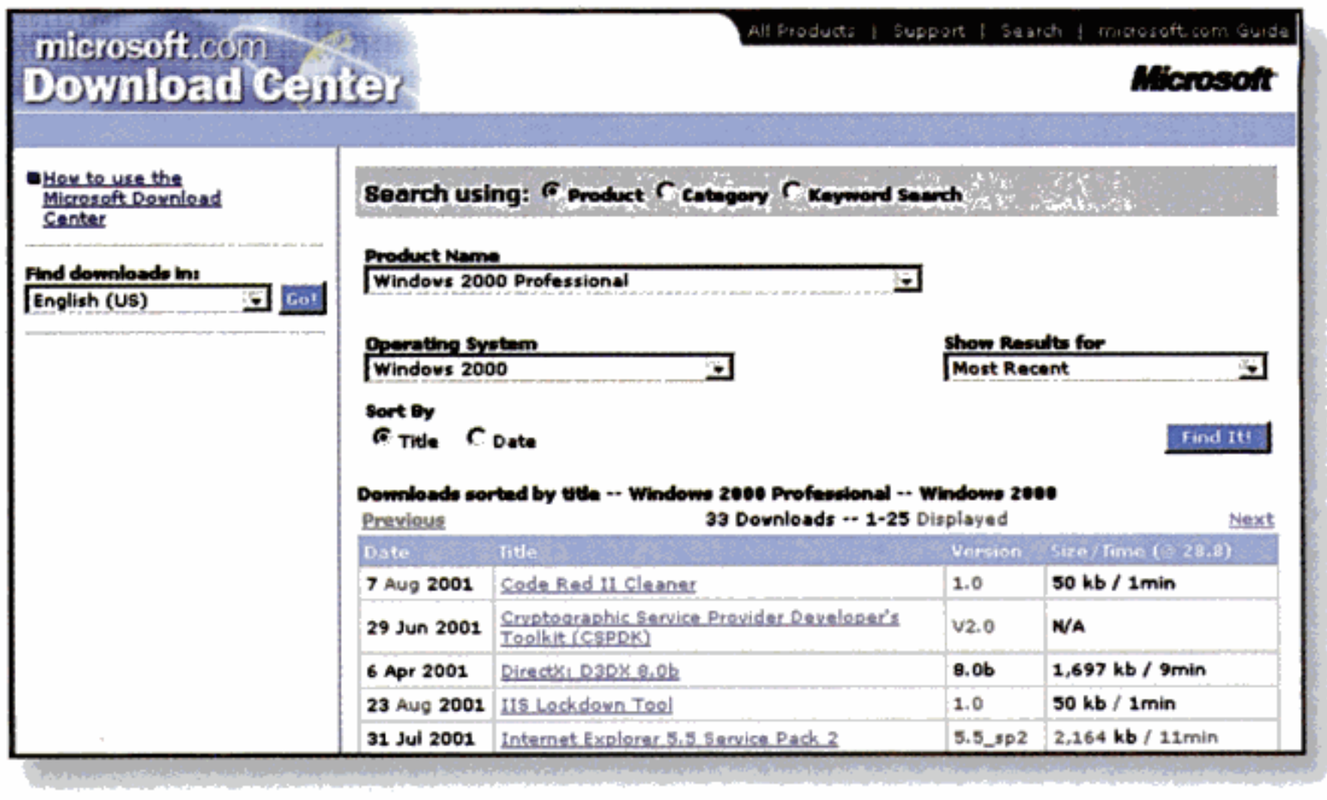
Dick has received a lot of e-mail on this specific issue, but because he prefers to ignore all e-mail not labeled "Do you think I have what it takes to have my own amateur site?," it falls on the Doctor to answer the call. Windows Update requires *Internet Explorer*, so to use it, you'll need to reinstall *IE*. Of course, if you're just looking for critical updates and don't want to reinstall *IE*, you can go to www.microsoft.com/downloads/search.asp and search by program and OS. For example, a Windows 98 user would put Windows 98 in both fields. If you decide you want to reinstall *IE*, it's a little more tricky than it might otherwise be since you can't use Windows Update. To find a download, head over to www.Microsoft.com/ie and grab the latest copy.

Sircam Screwed Me

I foolishly opened an attachment a friend sent me and infected myself with the Sircam virus. I went ahead and moved everything out of my My Documents directory so that I don't send my personal files to everyone I know, but I don't have a clue how to get rid of the nasty little bugger. Just running my virus checking software isn't really helping.

—BRYANT BRABSON

Well, Bryant, the Doctor certainly feels your pain, as he receives dozens of Sircam-type worms every week. Sircam is especially insidious because it disguises its unpleasant payload as a document sent from a friend that "needs your attention." These files look to the user like text files or *Word* documents, but they appear to the OS as batch files or executables



While it's more difficult to get to system updates without using Windows Update, those files are still available by searching Microsoft's Download Center site.

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and can cause more damage than Bubba Paris in a junk food factory.

To sweep the little bugger from your hard drive, go to the SARC site (www.sarc.com/avcenter/venc/data/w32.sircam.worm@mm.removal.tool.html) and download the removal utility. Of course, an ounce of protection is worth a pound of cure. Avoid e-mail attachments that include .bat, .com, .lnk, and .pif extensions. If you can't see the attachments within your e-mail program, save them to your desktop, where you *can* see them. Just don't open them!

Ancient AMD

I recently purchased a GeForce2 MX-400 graphics card. The card is great and performs well on *Quake III* and other OpenGL games. I used the program *3DMark2001* that was included on your August CD, and it showed I had only 556 3DMarks. I am running a 450MHz AMD processor with 196MB of RAM. I saw that the same system with 128MB of RAM and the same graphics card had over 1000 3DMarks. I'm curious to know why that is.

—DAVID MOSS

It sounds like you've got an inferior AMD processor. Although you didn't say so, we think you've got a K6-2 or K6-III processor from AMD. While a 450MHz K6-III seems like it should be almost as fast as a 500MHz Athlon or Pentium III, it isn't. The Athlon sports a much more powerful floating-point processor, which is what drives 3D applications.

How can you juice more 3DMarks out of your system? Since you're dealing with a system that's more than two years old, there's not much to be done. Even overclocking your videocard and CPU wouldn't help much. The only thing you can do to boost performance is upgrade your CPU, mobo, and memory to a more modern setup. The good news is that you should be able to upgrade to a 1.2GHz Athlon, complete with motherboard and RAM, for less than $350. First, make sure your power supply and case can accommodate a new mobo. ■

Second Opinion

Resource Rapture Part Deux

Unlike Mr. Richard Harris, whose letter you published in the August 2001 issue, my missing RAM isn't a mere six percent of system resources. It's more like 75 percent. Even after a reboot, I have less than 25 percent free. Even after I added an additional 128MB SDRAM to the original 64MB, the problem persists, and I have just a few additional programs (such as my resource meter and firewall) open at reboot. When I get on the Internet and have a few messenger windows open, along with one browser, it becomes a disaster. I personally blame all this on the evil computer god, Ishmu. He is the evil force behind all computer crashes, viruses, and load errors.

In order to avert Ishmu's powers, I'm curious as to whether there is a program out there that will free up my resources, or if I need to reconfigure Windows so it doesn't use as much of my resources. If I do need to reconfigure Windows, could you tell me what I should do to reverse this resource rapture?

—JOEL RITTENHOUSE

You call it Ishmu; we call it bad programs. Unfortunately, we have no way of knowing what resource meter and firewall you're using. Our recommendation would be to use msconfig.exe to disable all the programs that run when you start your PC, then re-enable them one at a time to see which one is the resource hog.

We said it back in August, but we'll say it again now. The amount of system resources free is separate from the amount of system RAM available. System resources are a 128KB section of memory that Windows uses to handle traffic from things such as input devices and ports, Windows apps, and fonts. This means that upgrading your memory won't free up system resources. The only way to do that is to close some apps or figure out which of the apps you always run is eating your resources.

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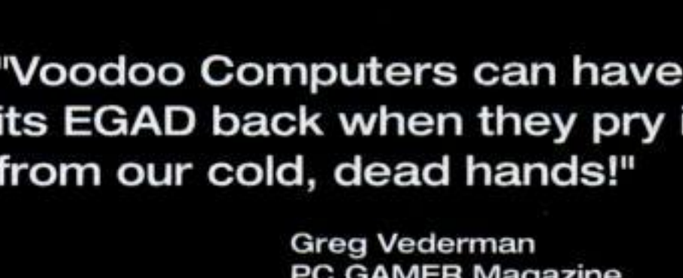

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How To... A step-by-step guide to tweaking your PC experience

SET UP YOUR 5.1 Speaker Rig

Configuring a 5.1 speaker rig isn't as easy as connecting a few wires and pointing the speakers at your head. Here's everything you need to know about getting the best audio from your PC theater setup.

BY ROB PRATT

If you already have a 4.1 surround-sound speaker system for your PC, you might assume that setting up a 5.1 system is a slam-dunk—but you'd be wrong. Sure, the Dolby Digital 5.1 spec adds only a middle channel to the traditional 4.1 mix, but 5.1 systems actually demand a degree of fine-tuning that belies their ostensible simplicity. Regardless, positioning your 5.1 speakers for optimal effect is well worth the trouble: The improvement in sound imaging that occurs when you jump to 5.1 is dramatic, especially for DVD movie playback. Your 3D soundscape suddenly comes alive with perfectly positioned music and sound effects.

The Dolby Digital 5.1 spec was developed for movie theaters and was never intended to be shoehorned into living rooms or the types of rooms that usually host PCs. The 5.1 audio format anticipates listeners sitting in much larger rooms, much farther away from their speakers. Small, tight spaces lessen the reverberation that's integral to 3D sound imaging and shrink one's "sweet spot" (that is, one's ideal listening position).

But fear not—even if you live in a small hutch or hovel, you still may be able to make your PC theater system sound like the local multiplex. We asked pro audio engineers for advice on how to place 5.1 rigs in four different perplexing PC theater environments. Learn what you can from our case studies and apply your new knowledge at home.

Test Your 5.1 Speaker Placement

There is no set formula for determining the precise placement of 5.1 PC speakers, so you'll need to place the speakers, gauge results, then tweak, gauge, tweak, and so forth. First off, make sure your speakers are wired correctly (see the "Getting Connected" sidebar on page 68) and that they're set at equal volume. The front left signal from your PC's soundcard should come out the front left speaker, the rear right signal should come out the rear right speaker, and all speakers (except the subwoofer) should sound like they're playing at the same volume.

Your speakers' "phase" (that is, their polarity) is crucial to creating a good audio field. If your speakers connect with RCA jacks, and you never have to insert a bare wire into a spring-lock or clamp-down connector, then you probably don't have to worry about phase problems. But if you do have to connect bare wires at some point, you should verify that you've connected the correct wires to the correct connectors. Out-of-phase speakers produce audio that seems to be playing on top of your head instead of between your ears, and bass oftentimes seems missing. The *Video Essentials* DVD (a home-stereo configuration disc available at many video rental stores) and most THX-certified DVDs include pre-generated pink noise that will help you pinpoint out-of-phase speakers.

After you've tackled phase, take a look at your speaker placement. Ideally, all three front speakers (left front, middle, right front) will be the same height off the floor and level with your listeners' heads. Rear speakers should be slightly higher than the front speakers and don't need to be pointed directly at the listening area.

Since bass frequencies are nondirectional, your subwoofer can go almost anywhere, but is usually best placed on the floor near the front speakers or in a convenient corner. To find the best subwoofer placement in our tests, we put the sub in the sweet spot (that is, the exact place where we intend to be sitting), disconnected all the speakers but the sub, then played a music track with a lot of bass. We crawled around the room until we found the place where the subwoofer sounded best, then positioned the sub in this location. You'd be surprised by how well this trick works.

Final adjustments are based on subjective observations. For the clearest 3D definition from the front speakers, angle them toward the sweet spot. For a smaller sweet spot, angle the front speakers in toward each other even more. For a larger sweet spot (which will accommodate more listeners), use wider, more obtuse angles. Rear speakers can be placed facing the sweet spot or angled toward the top-rear corners of the room to maximize effectiveness.

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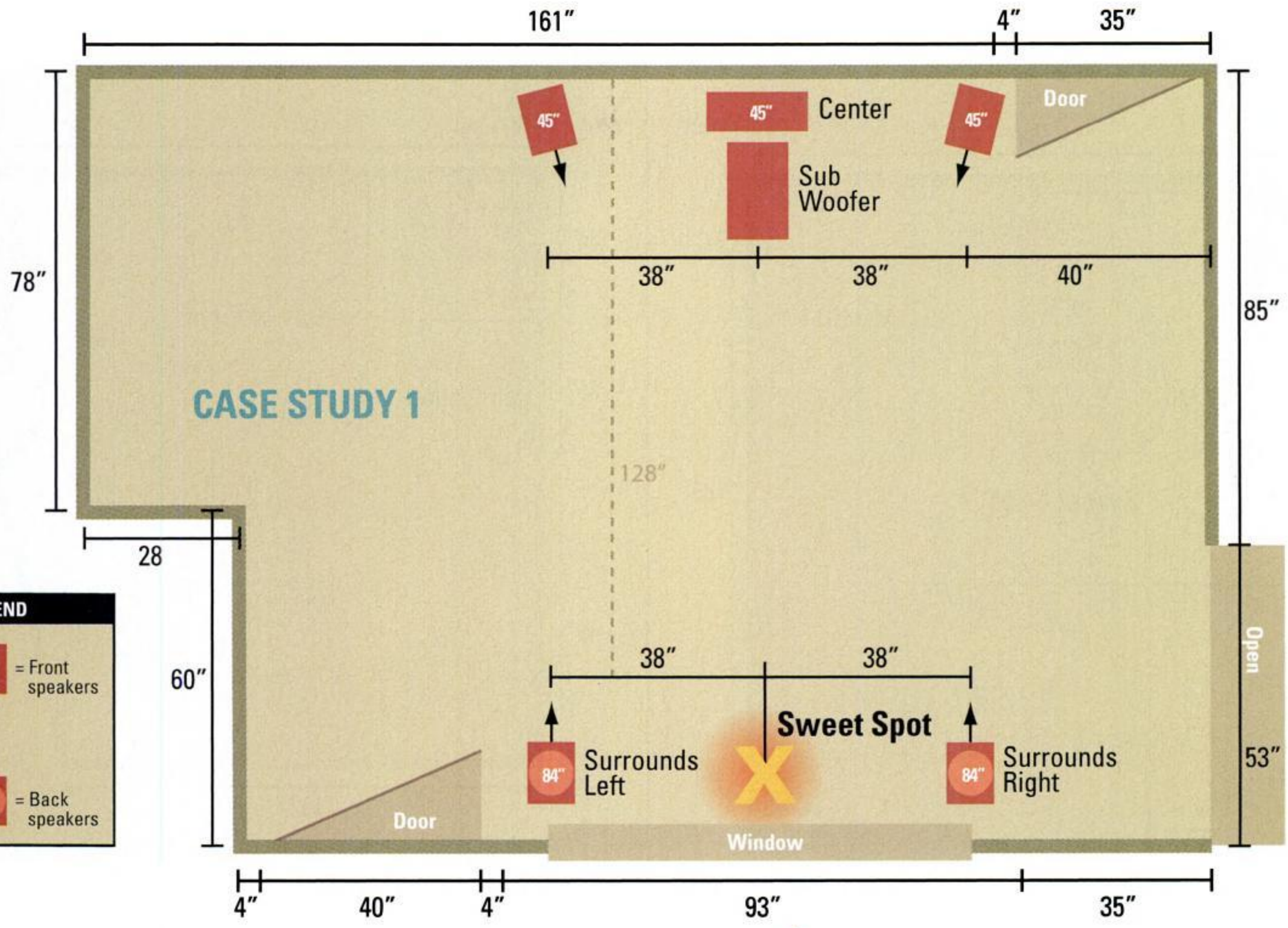

Case Study 1

A Living Room from "L"

Over the next three pages we'll show you how to deal with quandaries ranging from bass traps to rooms with excessive echo. Of course, these are just guidelines. Unless you have rooms that are identical to these, you'll need to set up your speakers, then tweak their orientation.

The worst listening environments are perfectly square rooms and rectangular rooms where the long dimension is twice as long as the short dimension. Both spaces are highly prone to generating "room modes" or "standing waves," which emphasize certain frequencies, diminish others, and generally shoot to hell the smooth frequency response of a good set of speakers. The slightly L-shaped space of our first case study—a living room in a modern apartment—has characteristics of both of these troublesome models. Even worse, our intended sweet spot abuts the rear wall, which meant we had limited options for positioning the rear speakers.

Front speaker and sub placement was relatively straightforward. The front speakers were placed far apart and angled slightly inward to provide a wide sound field at the sweet spot and still give some positional cues. We placed the subwoofer directly in front of the PC.

Placement of the rear surround speakers proved more challenging. Aiming the rear speakers directly inward at the listening position sounded too harsh, but turning them outward caused uneven reflected sound. When turned outward, away from the sweet spot, the rear left sounded great, since it reflected off of a nearby wall. The rear right, however, aimed directly into another room, and long reverberations from the open space made for lopsided surround effects, especially when paired with the crisp-sounding, quick reflection from the left. The best-sounding solution was to mount the speakers high on the rear wall (roughly three feet above the sweet spot) and directly in line with the front left and front right speakers. Tilted toward the ground at a 45-degree angle, the rear speakers then delivered an enveloping surround-sound effect.

READING BETWEEN THE LINES

After we optimized the speaker placement for each of our case studies, we carefully measured each room, and drew diagrams of the rooms and the speaker placements within. Here are the important things you need to know about reading the floorplans.

- **Speaker height** Each speaker has a number inside it. That number is the height in inches from the floor to the center of the speaker.
- **Subwoofer height** Because of the large size and weight of most subs, they work best when placed on the floor.
- **Obstructions and problem areas** Large windows, cubbys, nooks, crannies, doors, and almost any other irregularity in a room can cause acoustic problems. We labeled all the major problem areas for each of the four case studies.
- **Sweet spot** The sweet spot is the ideal listening area for each speaker config in each room. Inside the sweet spot, you'll get the best positional audio possible.

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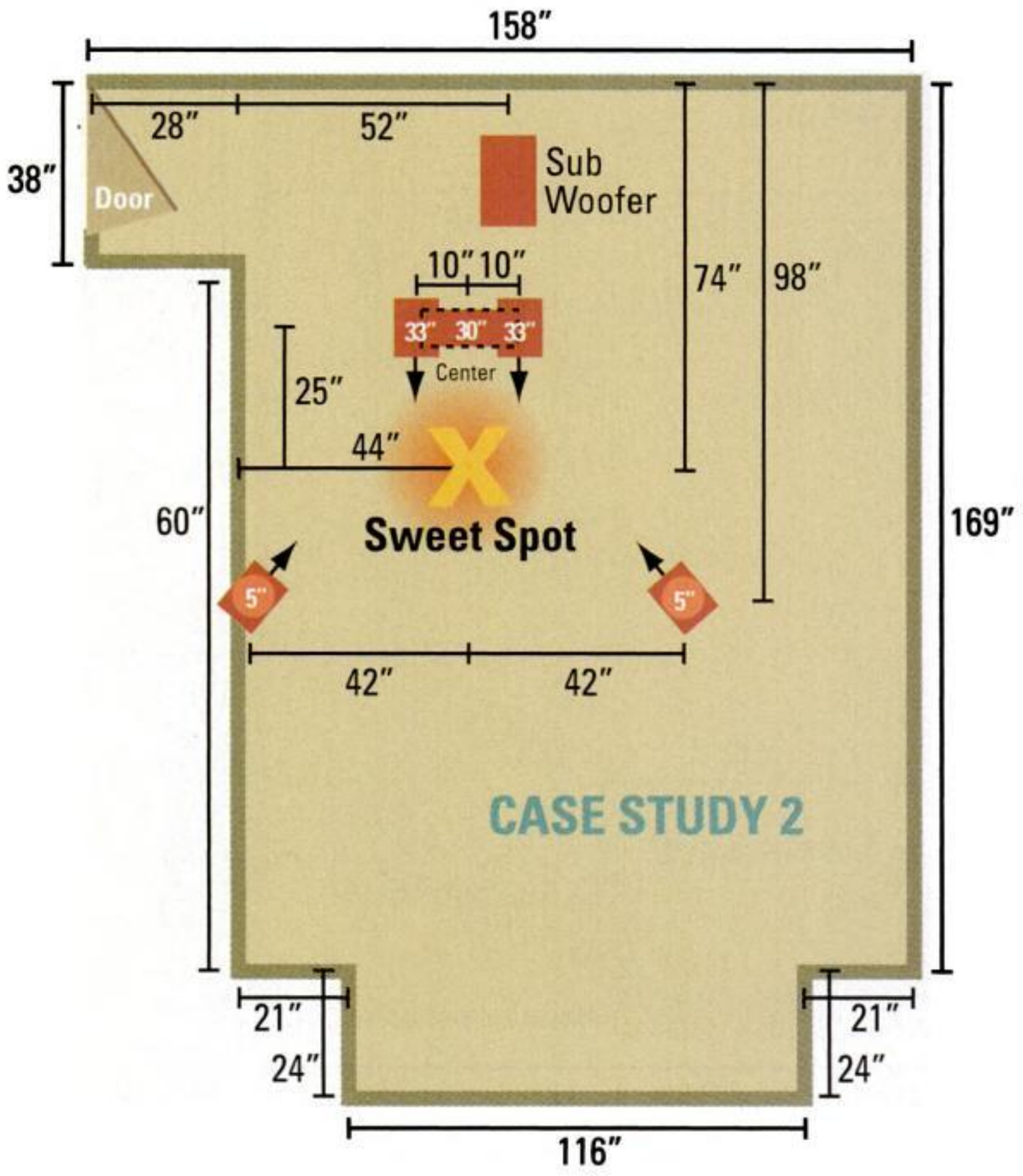
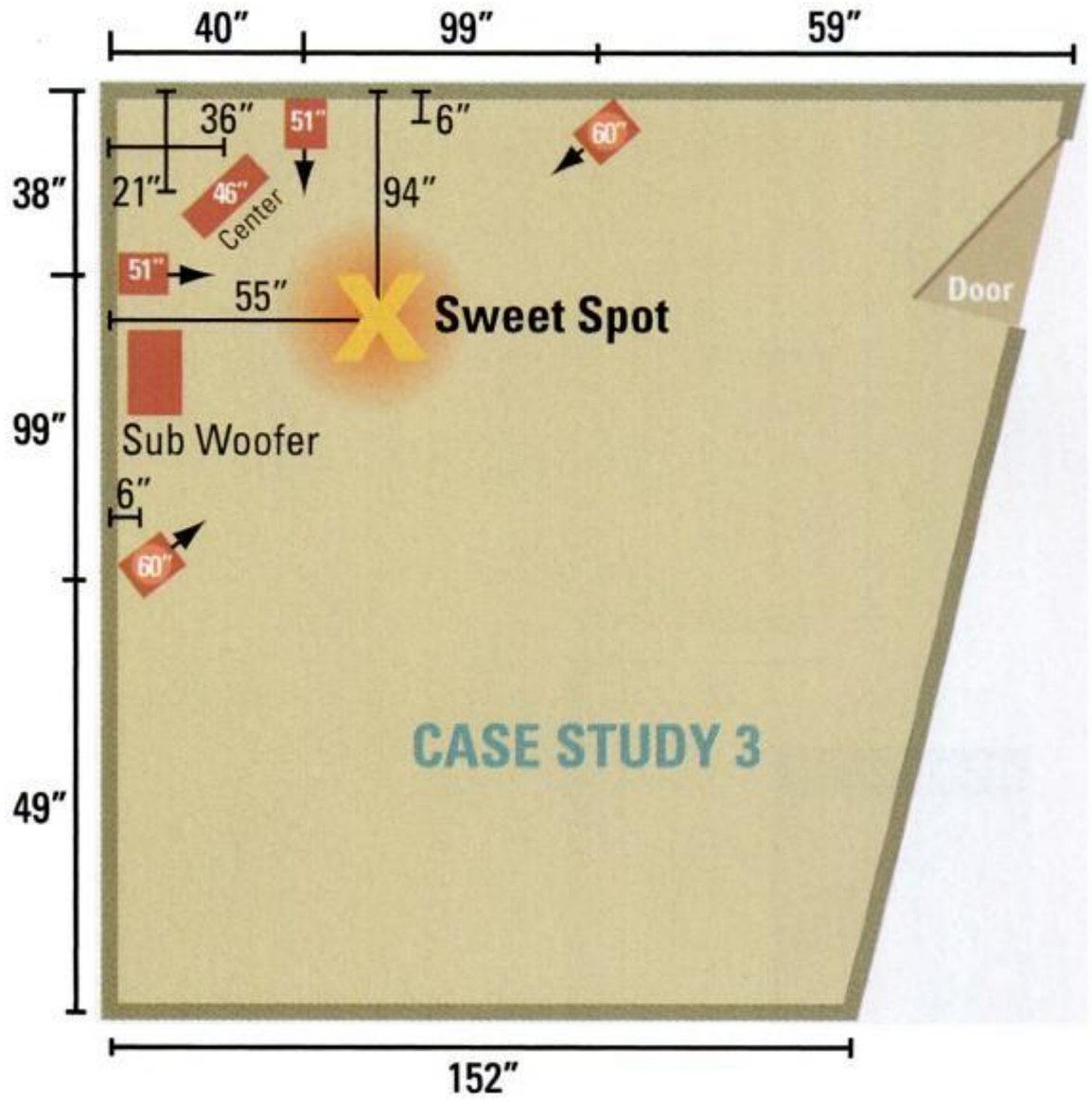
5.1 Setup





Case Study 2

The DVD Desktop

We were pleasantly surprised by how easy it was to fine-tune this small listening space—a computer den with the floor space of a two-car garage. Our biggest problem wasn't even related to acoustics; it had more to do with cramming so many speakers into such a small area. The whole system—speakers and all—had to fit into an area about three feet wide.

Because the desktop space was so narrow, we had little opportunity to do anything more than position the front speakers on either side of the PC monitor and place the center speaker on the tabletop between the front edge of the monitor and the back edge of the keyboard. We turned up the center speaker volume by 2dB to account for its occlusion by the keyboard.

By using our subwoofer test, we found two spots underneath the desk that were good for the sub. To keep the subwoofer close to our PC and minimize wire-runs, we sacrificed leg room and put the subwoofer directly beneath the PC monitor.

Typically, the optimal placement of rear speakers is directly aside the listening position, aimed inward, and a little higher than head-level to soften the directionality of the surround speakers. By placing the rear left and rear right on the floor, we got close to this optimal placement, though our speakers ended up below head level. The result, however, was the most convincing surround sound of all our case studies.

Case Study 3

Corner Pocket

Take the tight configuration of a desktop space, then cram it in the corner of a large room. Can you still have a great PC theater? In our third case study—a game testing room at our publishing company—a corner workstation configuration forced us to make an extra effort in getting our rear speakers positioned and balanced. A low ceiling and asymmetric room shape only compounded our difficulties, as did the occupant of an adjoining workstation, who didn't like the idea of a rear speaker planted on his desk.

Limited corner desktop space forced us to make a trade-off between the spread of the front speakers and desktop workspace. If we set up the front left and right for a wider spread, then positioning the center-channel speaker to be in line with them would use up all of our available desktop space. So we compromised by going with an arrangement that gave us roughly four feet of separation between the front left and front right speakers, and about two square feet of desktop space in front of the center speaker.

Positioning the rear speakers was more of a challenge, because of the presence of another workstation. Eventually, we created tiny shelves for our speakers, placed them slightly higher than head-level, and aimed the speakers directly inward. The vast spread between the two rear surround speakers worked well to create a cocoon of sound—even though both speakers were angled directly at our listening position. For subwoofer placement, we determined that a spot three feet to the left of the corner offered the tightest sound (direct corner placement was too loud and boomy). To fine-tune the subwoofer, we boosted its volume by 6dB to compensate for the fact that our workstation's desktop occluded earshot to the subwoofer from the listening position.

Copyrighted material

Getting Connected

Most current soundcards and speakers provide several different ways to wire your PC for Dolby Digital 5.1 sound. Which one you choose is a matter of preference, but be aware that not all PC hardware supports all common analog and digital audio connectors. Here's a guide to what goes where.

1/8-inch "mini" connectors (analog)

■ Input location

On the back of most soundcards

■ What you need to know

Since they handle only two audio channels per connector, you'll need to use three of them to send full 5.1 audio to your speakers. Most soundcards color-code the mini jacks so you know which speakers to plug in—green for front right and front left, black for rear left and rear right, and yellow/orange for center and subwoofer. The connector for the center and subwoofer often does double duty as a digital (S/PDIF) connector. You'll probably have to toggle the connector's format (to analog or digital) on your soundcard's control panel.

■ Speaker cable

Usually mini connectors hook up to PC speakers with simple jumper cables that have a male 1/8-inch plug on each end. Some PC speakers have RCA connectors that use a splitter cable with a male 1/8-inch plug on one end and a pair of male RCA plugs on the other end.

1/8-inch "mini" connectors (digital)

■ Input location

On the back of most soundcards

■ What you need to know

These connectors send digital data to your PC speakers, which locally convert the data stream to an audio signal you can hear. Virtually all PC soundcards and speakers use the Sony/Philips Digital Interface (S/PDIF), a data format for audio that typically uses an RCA connector for speaker input. (Sometimes PC speakers label the S/PDIF input as "coax digital" or simply "coax.") If your soundcard uses a mini connector for digital S/PDIF output, you'll probably have to select "digital output" on the soundcard's control panel.

■ Speaker cable

Most soundcards that support S/PDIF output come with a cable that has a male 1/8-inch plug on one end and a male RCA plug on the other end.

RCA connectors (analog)

■ Input location

On the back of most PC speakers

■ What you need to know

These connectors—the same you'll find in traditional home-stereo systems—can work in your PC theater system as both inputs and outputs for analog audio. Typically, they're used in pairs and color-coded so you can keep track of which plug goes where: red for the right channel, and black or white for the left channel.

■ Speaker cable

If your PC speakers use RCA inputs, they'll probably come with splitter cables (a male 1/8-inch plug on one end, and a pair of male RCA plugs on the other end) to connect to your soundcard.

RCA connectors (digital)

■ Location

On the breakout panel/box for a soundcard, and on the back of many PC speakers

■ What you need to know

This scheme has an RCA output jack on your PC connecting to an RCA input jack on your speakers. As with a mini-jack digital output, the RCA S/PDIF output on your soundcard will probably have to be enabled in your soundcard's control panel.

■ Speaker cable

Because RCA jumper cables with male RCA plugs on both ends are commonly available at electronics and stereo stores, few soundcards and PC speaker sets include them.

Optical connectors (digital)

■ Input location

On the breakout panel/box for a soundcard, and on the back of some PC speakers

■ What you need to know

As with RCA connectors, optical connectors use S/PDIF to transfer a data stream from a soundcard to a set of speakers, where the stream is translated into an audio signal you can hear. Using optical connectors is by far the simplest way to rig Dolby Digital 5.1 audio: Just snap the plugs on either end of a standard optical cable into the jacks on your soundcard and PC speakers. The catch is that optical cables cost about four times more than RCA jumper cables, and because they're made of fiber-optic material, they're much more fragile. ■

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Designed for Microsoft® Windows® XP

Experience

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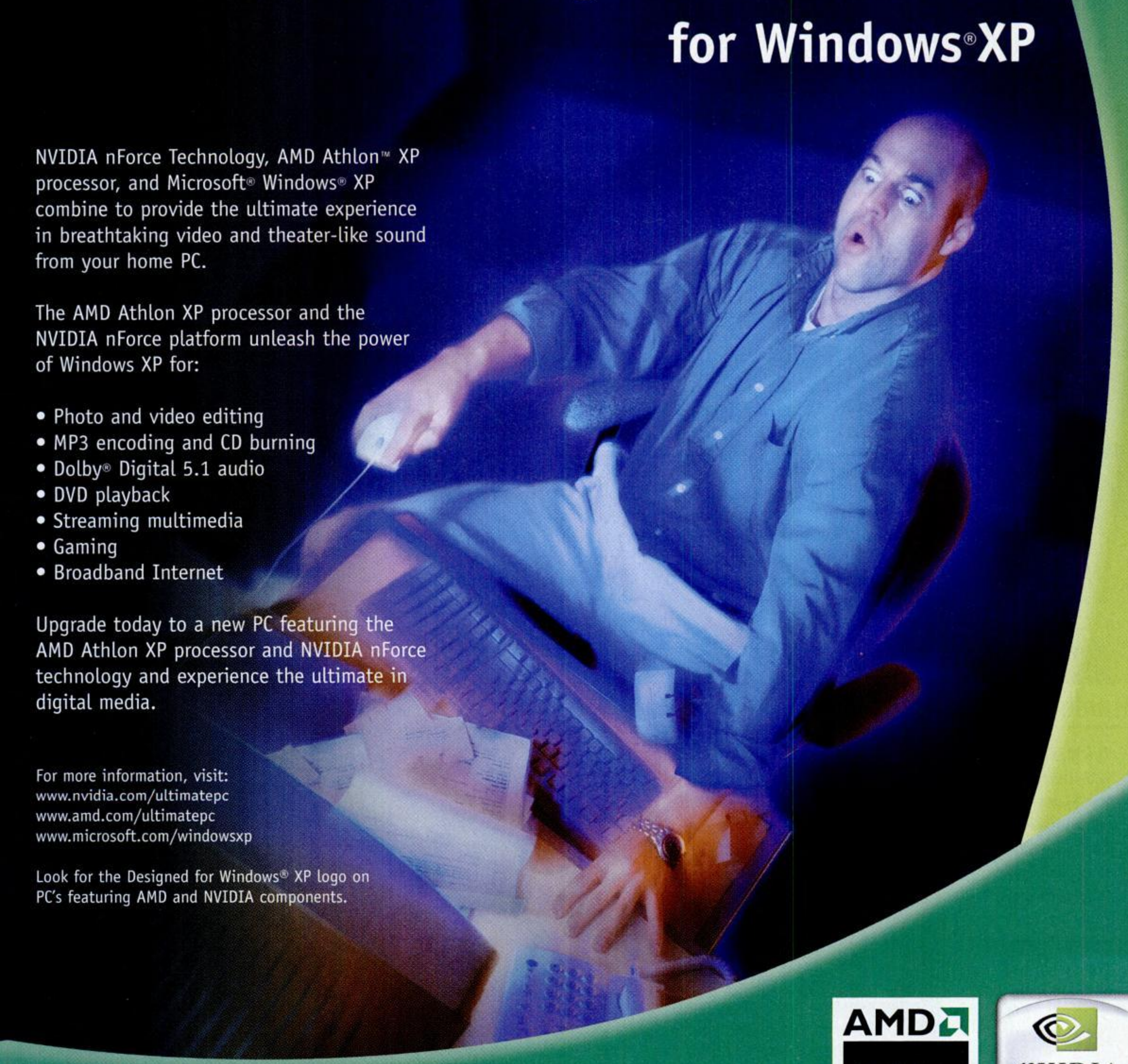

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The AMD Athlon XP processor and the NVIDIA nForce platform unleash the power of Windows XP for:

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DOLBY DIGITAL

AMD Athlon™ PROCESSOR XP

NVIDIA nFORCE

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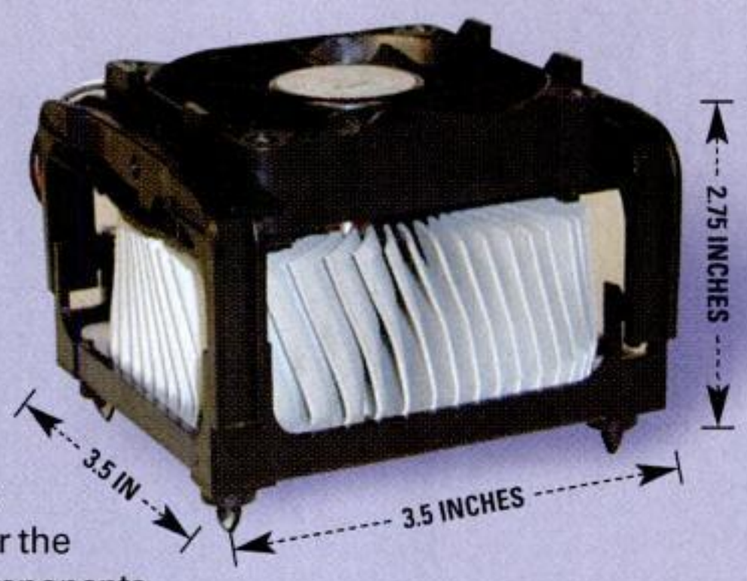
The Big Chill

A cold wind blows from Taiwan



The Pentium 4 is a relatively cool-running CPU—you can thank Intel's energy-efficient process technology for that. But once Intel begins cranking frequencies toward the 3GHz mark, headroom will disappear, and heatsinks will have to be ready to meet the challenge. Enter the Sun Flower heatsink/fan combo from Asia Vital Components (**www.avc.com.tw**). At 3.5x3.25x2.75-inches, it's one of the most mammoth pieces of active-cooling we've ever seen. And with aerodynamically curved heatsink fins, it even looks cool. The part is rated to support 2.4GHz. No word yet on whether thermal paste manufacturers will start selling their products in two-liter bottles.

No Assembly Required

How to join the case-mod scene without getting your hands dirty

You've overclocked your videocard, rounded your cables, and streamlined your system for the fastest boot times possible. But your custom-built machine still looks beige-box generic. Fortunately, for people who don't know a Dremmel tool from a torque screw, the cult of PC case modding has given rise to a cottage industry that turns out souped-up exteriors for hack-and-solder know-nots.

"DIVINE INTERVENTION"

Based on the tall-tower Alaska case from Inwin, Computers Divine's custom-designed case came with a spattered, red-and-black paint job complete with two embossed *Maximum PC* logos. The case also features a built-in baybus (to control its numerous integrated fans), rolling casters, a viewing window, a neon tube, and a 350W power supply. Custom airbrushing starts at $100. (The company even does monitors and keyboards!)

$500, www.computersdivine.com, 888.773.8463

"CRYSTAL CLEAR"

If Wonder Woman ever needed a PC to check online weather reports before taking wing in her invisible plane, her rig would most likely be based on this case. Built of quarter-inch cast-clear Lucite, this case from LoVermeCases redefines "open access." The case starts with four 92mm fan holes, and options include neon lights ($35), customized window etchings ($40), and 300W or 400W power supplies ($35 and $80, respectively).

$220, www.lovermecases.com, 250.721.3444

"FRIDGE JUNIOR"

At first look, the Stratagem case from Wahoo reminded us of "The Fridge," a massive ATX case we used for our content creation Dream Machine. But the Stratagem actually comes with sleeker styling, a more petite size, and a bunch of showy extras: acrylic cut-out windows, anodized fan guards, a laser-etched *Maximum PC* logo, a baybus fan controller, caster wheels, neon lights, rounded IDE cables, a front-panel cooling duct that feeds air through the case, and exhaust fans on the top, side, and rear. Does the list ever end? Seemingly, not.

$683, www.wahoocomputers.com, 888.400.0771

[LONG-TERM ROAD TESTING]

The yellow drive is still slooowww

THE PRODUCT: BUSlink USB Hard Drive
ORIGINAL VERDICT: 8 (June 2001)

WHAT WE SAID THEN: "[The BUSlink is] metal, sturdy, and stackable, so if you need more storage later, you can keep adding new drives until you blow a wall socket or run out of USB ports. The BUSlink ranges in size (at press time) from 10GB to 60GB. It connects easily, and has a handy on/off switch that makes it a perfect backup drive. At only two pounds, it isn't inconvenient to put it into your briefcase and go."

SIX MONTHS LATER: The good news is that the drive is now available in an 80GB capacity. The bad news is that the drive's original drivers were somewhat glitchy (we should have noted this) and updated drivers haven't fared any better on some PCs. Some machines liked the software revision, while others bluescreened during backups of MP3 files. Of course, the worst aspect of not just the BUSlink, but of any USB 1.1 storage device, is its pathetic speed. We should have been much more critical of this innate design drawback.

WHAT WE THINK NOW: Just what the hell were we thinking? Maybe we were mesmerized by the BUSlink's color or by the high quality of the case. But we now realize that no USB 1.1 hard drive should receive a verdict as high as 8. Coupling a hard drive with such a slow interface is like coupling a GeForce3 with a 166MHz Pentium system (the original USB spec chugs along at just 1.5MB/sec). Even worse, the larger the hard drive, the more frustratingly long the waits can be. If we could jump into the DeLorean, we'd go back to the past, slap ourselves on our collective forehead, and lower the score to a 5.

Dell Dimension 4300

The P4/SDRAM combo takes a shameful beating in our benchmarks

Open sesame: Like an Apple G4, the 4300 lets you open the system for easy entry.

An imposter? It looks like a GeForce3, it tastes like a GeForce3, it smells likes a GeForce3—but it doesn't perform like a GeForce3.

With SDRAM at bargain-basement prices and Rambus memory still hovering at $80 per 256MB stick, technical curiosity—to say nothing of the diminishing cash in our wallets—encouraged us to take a look at Dell's Dimension 4300. It's one of the first available systems to pair the unlikely combo of a Pentium 4 processor and single data rate SDRAM. Our first impressions? Lackluster benchmark results make the P4/SDRAM combo seem like a match made in hell.

Though it was armed with a 1.7GHz P4 and a half-gig of PC133, the Dimension 4300 compared none too well with other 1.7GHz P4 systems we've tested. The rig fared fine in our *MusicMatch* MP3-encoding test, but utterly lagged in our *Premiere* video-rendering benchmark. We also flinched at the thorough flogging the Dell endured while sparring with *SYSmark2001*, earning a measly 132 rating. Only the Sony VAIO system we reviewed in June rivals this mark when it comes to sheer embarrassment. (The VAIO hit 120 in *SYSmark2001*.) Last month, a 1.7GHz P4 system from Hypersonic hit 146, and a 1.3GHz Athlon system from Gamewarrior hit 141. Get the picture?

The 4300's most egregious sin is its unbranded GeForce3-based videocard, which garnered a paltry 13.4fps in our *3DMark2001* Game 4 test—the lowest Game 4 frame rate we've ever recorded from a GeForce3 board. We were so astonished by this result that we tested the same card on a 1.3GHz Athlon system to see if the Dell's SDRAM main system memory dragged down the videocard. Nope, the same GeForce3 achieved 13.2fps on the Athlon. We then subbed an Asus GeForce3 into the Dimension 4300 to see if we could pin the blistering performance blunder on Dell's P4/SDRAM mobo. The result? A totally respectable score of 15.4fps—exactly the mark that other GeForce3s delivered in other systems. We were forced to conclude that the GeForce3 bundled with the Dimension 4300 is hobbled by some type of cost-cutting configuration decision. Oh well, at least it is a GeForce3 and will render DirectX 8 games with all the visual bells and whatnot.

We were also disappointed with the bundled Harman Kardon 2.1 speaker system. While the system is a passable audio solution, the last thing we wanted to see after the GeForce3 letdown was a set of speakers obnoxiously shaped like champagne glasses. Surprisingly, they gave us a lift, with crisp audio quality (a bit of excessive midrange squawk wasn't surprising, given the 2-inch drivers on the satellites). Though they don't get very loud, they're up to the task of everything from classical tracks to serious, bass-rumbling shoot-outs.

Dell also neglected to include a CD-RW drive, leaving the 4300 with a mere 16x DVD-ROM drive to handle optical duties. With optical drive prices on the cheap side, a DVD-ROM/CD-RW combo is a minimum requirement for any respectable system.

This is the second Dell machine we've tested lately that's left us scratching our pates (the Dimension 8100 reviewed in September received a 6 verdict). Granted, Dell is selling the 4300 as a mid-level system, not a barnburner, and we can grudgingly forgive the lack of handy accoutrements, considering the rig's low price. Performance, however, is another matter. We're not ready to pass judgment on the SDRAM P4 chipset, but we strongly recommend you pass on this poorly performing Dell.

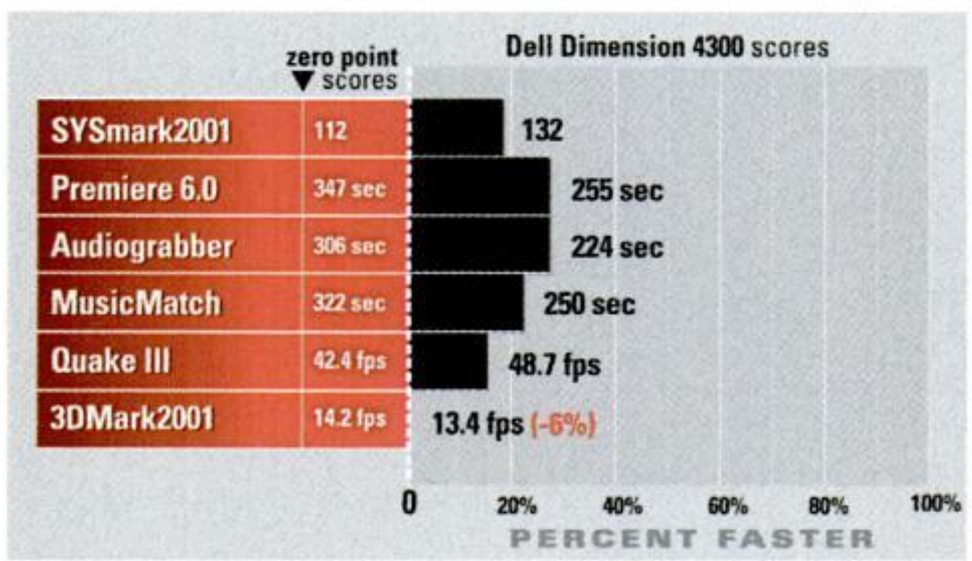
—EDWARD CHAMPION

UNDER THE HOOD

THE BRAINS	
CPU	Intel Pentium 4 1.7GHz
Motherboard	Proprietary Dell mobo
RAM	Two 256MB PC133
I/O ports	Four USB, two FireWire, one serial, one parallel, PS/2 keyboard and mouse, one game-port, one Ethernet, headphone jack
NETWORKING	
LAN	3Com 3C905C 10/100 Ethernet PCI card
Modem	N/A
DISPLAY	
Videocard	nVidia GeForce3 64MB DDR
Monitor	17-inch Dell M991 monitor
Refresh@ max res	75Hz@1600x1200
STORAGE	
Hard drive	60GB IBM Deskstar, 7200rpm
DVD-ROM	16x NEC DV-5800A
CD-RW	None
SOUND	
Soundcard	Creative Labs Sound Blaster Live! 5.1 Value
Speakers	Harman Kardon HK695 2.1 speakers
MOUSE	
Mouse	Dell optical mouse
BUNDLE	

Windows ME, *FoneSync*, Microsoft *Works*, Microsoft *Money*, Microsoft *Word*, Norton Antivirus 2001, WinDVD

BOOT: 48 sec **DOWN: 5 sec**



Full benchmarking details in the Mag Reprints section of MaximumPC.com

MAXIMUMPC VERDICT

Dimension 4300
DELL

+ WHAT WE LIKE
It's got a snazzy case.

– WHAT WE HATE
In the words of The Simpsons' Comic Book Guy, "Worst. GeForce3. Ever."

800.915.3355 www.dell.com
$900 w/monitor

5

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Motorola Accompli 009

New all-in-one communications device is a superlative, if plodding, fait accompli

As far as smartphones go, the Motorola Accompli 009 occupies an intriguing niche alongside other cell phones with e-mail and web browsing capabilities. Already popular in Asia but new to the U.S., the Accompli is the first smartphone we've tested that incorporates the tri-band GPM-GPRS protocol, which allows the device to send data at 900, 1800, or 1900 baud. This is about three times faster than what you'll find when using the more common circuit-switched data on GSM smartphone technology. With support for cell phone calls, paging, e-mail, and web browsing, and a contacts database, the Accompli made us salivate just thinking about its high-speed portable possibilities.

The easiest thing to do on the Accompli is make phone calls. Local, long distance, and international calls all transmitted with reasonable clarity on our end, and our test callees reported that our voices didn't sound like crackly Eastern European radio broadcasts on their end.

People who are tired of making Graffiti strokes on Palm OS PDAs will appreciate the Accompli's built-in keyboard. Just be aware that it's extremely compact—so much so, in fact, we briefly considered slicing off a few maladroit fingers for the sake of productivity. But in the end, we were able to hunt and peck quite effectively when composing e-mails.

Unfortunately, when it comes to pure, PDA-like productivity features, the Accompli falls short. The device uses the Wisdom OS for PDA functionality, which means only a handful of third-party apps are available (Palm and Pocket PC aficionados, consider yourselves warned). The Accompli is also slim on the software bundle side, offering just the bare essentials: the desktop-interface app *PCPartner, PocketPix* for image viewing, and *TrueSync* for synchronizing the Accompli with a PC. The Accompli does, however, feature a dazzling 256-color LCD screen, conveniently backlit for use in the dark. The color display adds pizzazz to the stripped-down look of web pages rendered with WAP, but the display's small size makes the Accompli unsuitable for browsing graphics-heavy pages.

To send an e-mail message, you'll first have to set up a contact record for the recipient if you haven't already entered all your contacts in the Accompli's database; you can't simply type in an e-mail address and send off a flurry of words on the go. We experienced a few connection problems when accessing e-mail accounts, but when the e-mail feature worked, the Accompli's download speed was astounding.

The Accompli 009's main downfall is the remarkable number of keystrokes required to perform any task. Need to spell-check your e-mail? That'll take three keystrokes. We also found it remarkable that we were able to program hotkeys to launch specific programs, but not to execute specific commands.

Motorola has produced a device that can easily replace your PDA, cell phone, and pager—but it comes with caveats. If you can stand the miniscule keypad and the extra keystrokes required to navigate through applications, then this is the first smartphone that won't keep you waiting when you have to send e-mail.

— EDWARD CHAMPION

Two-finger tango: The keyboard's tiny, but we were able to hunt and peck without too much trouble.

THE SPECS

Screen res	240 x 160, 256 color
Viewable image	2.5 x 1.5 in.
Processor	33MHz Dragonball VZ
Memory	8MB Flash RAM, 1MB RAM
Bundle	*PC Partner, PocketPix, TrueSync Plus*

MAXIMUM PC VERDICT

Accompli 009
MOTOROLA

WHAT WE LIKE

There are some handy and useful features packed into a communications device this small. The e-mail function (when it works) is incredibly swift.

WHAT WE HATE

The lack of apps for Wisdom OS limits your application palette. The slim bundle is inflexible for enthusiasts.

847.576.5000 www.motorola.com
$600

8

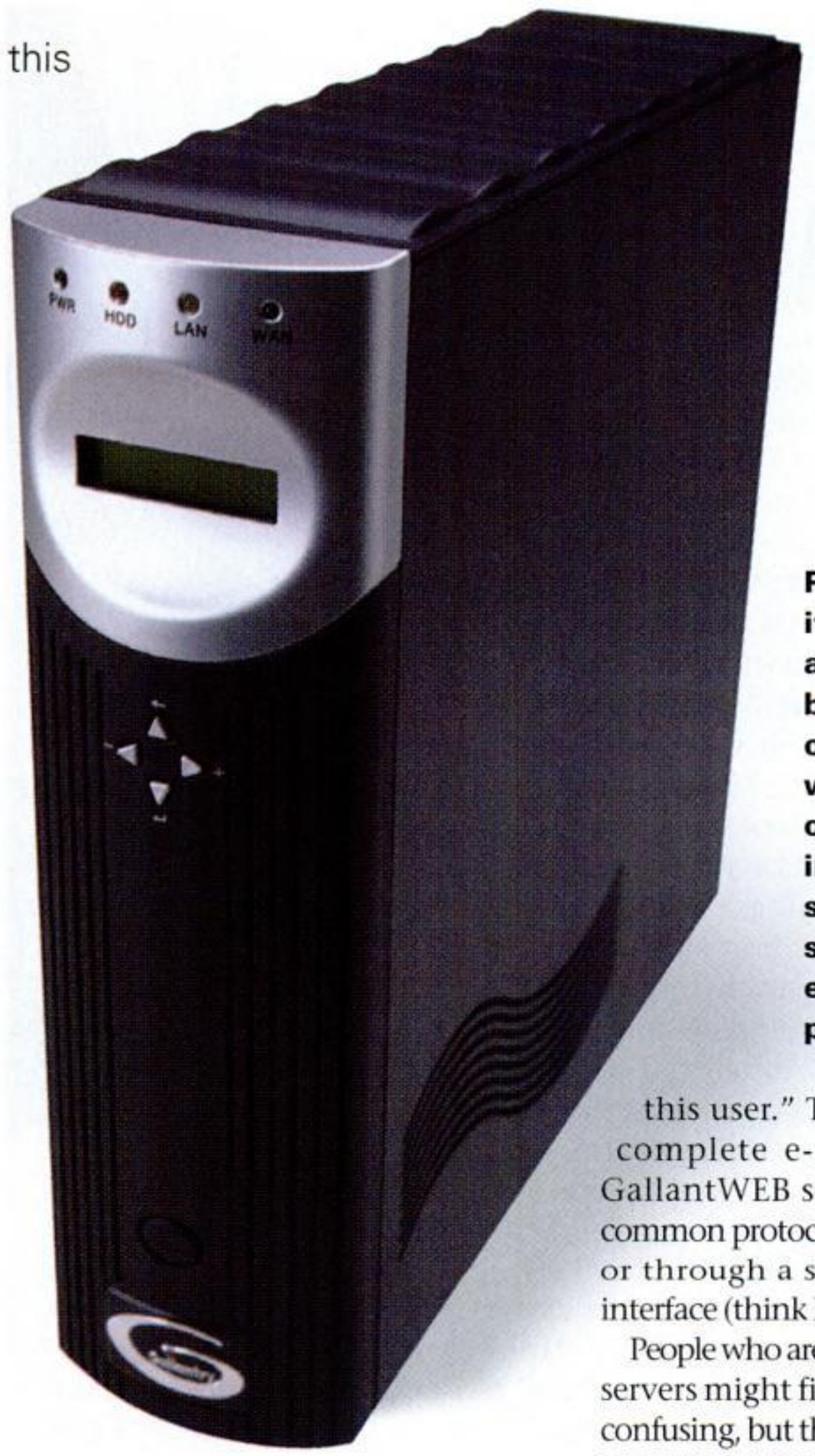
Gallantry GallantWEB

An art deco edifice isn't the only stylish touch on this easy-to-configure Internet server

Have a broadband connection to the Internet? Then you're ready to stake a claim on your own digital domain, a tiny slice of the net you can call home. With Gallantry's GallantWEB server, you can run a combo web/e-mail server and provide a high level of security for your small chunk of online real estate, all without mucking around in arcane configuration files.

Comprising a 633MHz Celeron processor, 64MB of SDRAM, and a 20GB hard drive, the GallantWEB is a short tower fronted by a vaguely art deco, fluted facade. The chocolate-brown case features a stippled finish and is topped with a silver capital that glows yellow with a three-line LED display. Once plugged into AC power and an Ethernet connection, configuration duties are performed through a web browser interface on a remote machine. If you want to work directly on the server, you're not completely out of luck—the box has all the back-panel connectors familiar to a regular PC, so you can hook up a PS/2 mouse, keyboard, and VGA monitor, if that's how you get your kicks. Hardcore Linux geeks will appreciate the option to dig into GallantWEB's configuration through a standard command prompt, but it's quite possible to set up and run the server without ever making contact with a shell command.

Though based on a Red Hat distribution of Linux that uses an aged 2.2-series kernel, the GallantWEB's main configuration interface doesn't proffer command lines or tricky Unix config files. As the administrator, you log into the server by browsing to a secure web page, entering a name and password, then paging through the configuration options. The base configuration requires a bit of planning. You'll need to have a good grasp on how you want to use the GallantWEB before you get started. Do you want an all-in-one Internet server (for web hosting, e-mail, and file storage) that doubles as a gateway router and firewall? Or do you want just a simple network storage server? This decision affects whether you need to configure one or both of the GallantWEB's Ethernet interfaces and determines which services you initially enable.



Plug it in and turn it on. It's not really as simple as that, but Gallantry's clear and concise web-based configuration interface makes setting up this stylish server as easy as is humanly possible.

If you do want it all, the GallantWEB is your new best friend—it features virtually everything you need to run your own Internet domain. It includes simple web hosting and e-mail, as well as advanced features such as domain name service and virtual private networking. For most people, the GallantWEB's basic services will work just fine. Adding more features to customize the GallantWEB for your needs is possible, but it's not easy. You'll have to install and configure additional services via the Linux command line.

At least tweaking the built-in services is a simple affair. To start an e-mail server, just click on the Email Server icon, click a radio button to "enable," and reboot. Setting up e-mail accounts is nearly as easy: Browse to the Email Service Administration page, click the User Account Management icon, then click "create new user." Now enter a few details for the new account, then click "create this user." The new user now has complete e-mail service on the GallantWEB server, either by using common protocols like POP3 and IMAP4 or through a slick web-based e-mail interface (think Hotmail or Yahoo! Mail).

People who are unfamiliar with Internet servers might find some of the options confusing, but the GallantWEB's defaults are secure and stable, and they only need tweaking for specialized uses. For experienced network administrators, Gallantry's GallantWEB server offers plenty of control. It's a rare server that can deliver both simple configuration and advanced controls—not even Windows 2000 Server presents so many options so clearly. GallantWEB is perfect for people who need the basics.

—ROB PRATT

MAXIMUMPC VERDICT

GallantWEB GN700-B20
GALLANTRY

WHAT WE LIKE

No Linux fuss, no config-file muss. The clearly presented browser-based configuration interface lets you point and click your way through server setup.

WHAT WE HATE

If you want to add any specialized services, you'll have to brush up on your BASH and perform the setup with a Linux command-line interface.

800.455.3166 www.gallantry.com
$1,150

9

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Toshiba MK5002MAL

Is that 5GB in your pocket?

Chances are, somewhere in the world—most likely in Japan—a group of engineers is meeting at this very instant to answer the question, "Yes, it's good, but what if we made it smaller?" Isn't everything better when it's smaller? Toshiba apparently thinks so. Its engineers slammed a 5GB hard drive into a Type II PC Card.

The MK5002MAL packs a single disk that spins at 3,990rpm and boasts an average seek time of 15ms. The drive has a 1MB buffer and supports ATA/66 transfer speeds. "Supports" is the operative word here, folks, because during testing, we couldn't get read speeds above 1.3MB/sec. Toshiba says the PC Card interface is the bottleneck, and that when the drive is added directly to an IDE chain using an adapter, it's several times faster (we didn't have an adapter to verify this claim). Just for kicks, we tested a 1GB IBM Microdrive to see if we could get higher throughput numbers, and to our surprise, the Microdrive offered nearly identical performance.

With throughput performance ranging from poor to dismal, the usefulness of the drive is limited to extremely niche tasks. For ultra-paranoid notebook users, the drive is a godsend for data backup. And who wouldn't want to carry around 5GB of MP3s for notebook playback?

Or you could just buy the MK5002MAL because it's an insane freak of PC nature.

WHAT WE LIKE: A whopping 5GB in a PC Card? Now *that's* some fancy engineering!
WHAT WE HATE: The transfer rate is a poor 1.3MB/sec due to the limitations of PC Card controllers.

—GORDON MAH UNG

MAXIMUM PC VERDICT: 7

$300, Toshiba, www.toshiba.com, 949.457.0777

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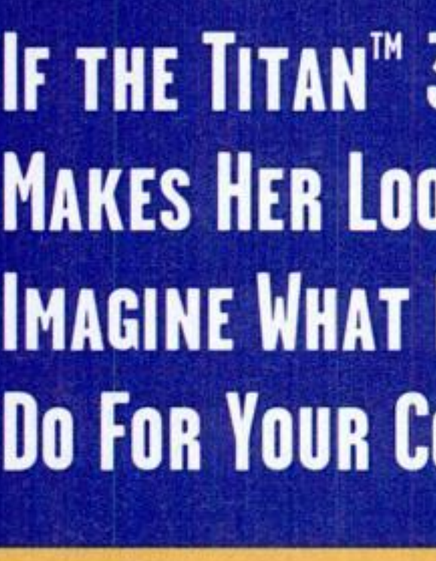

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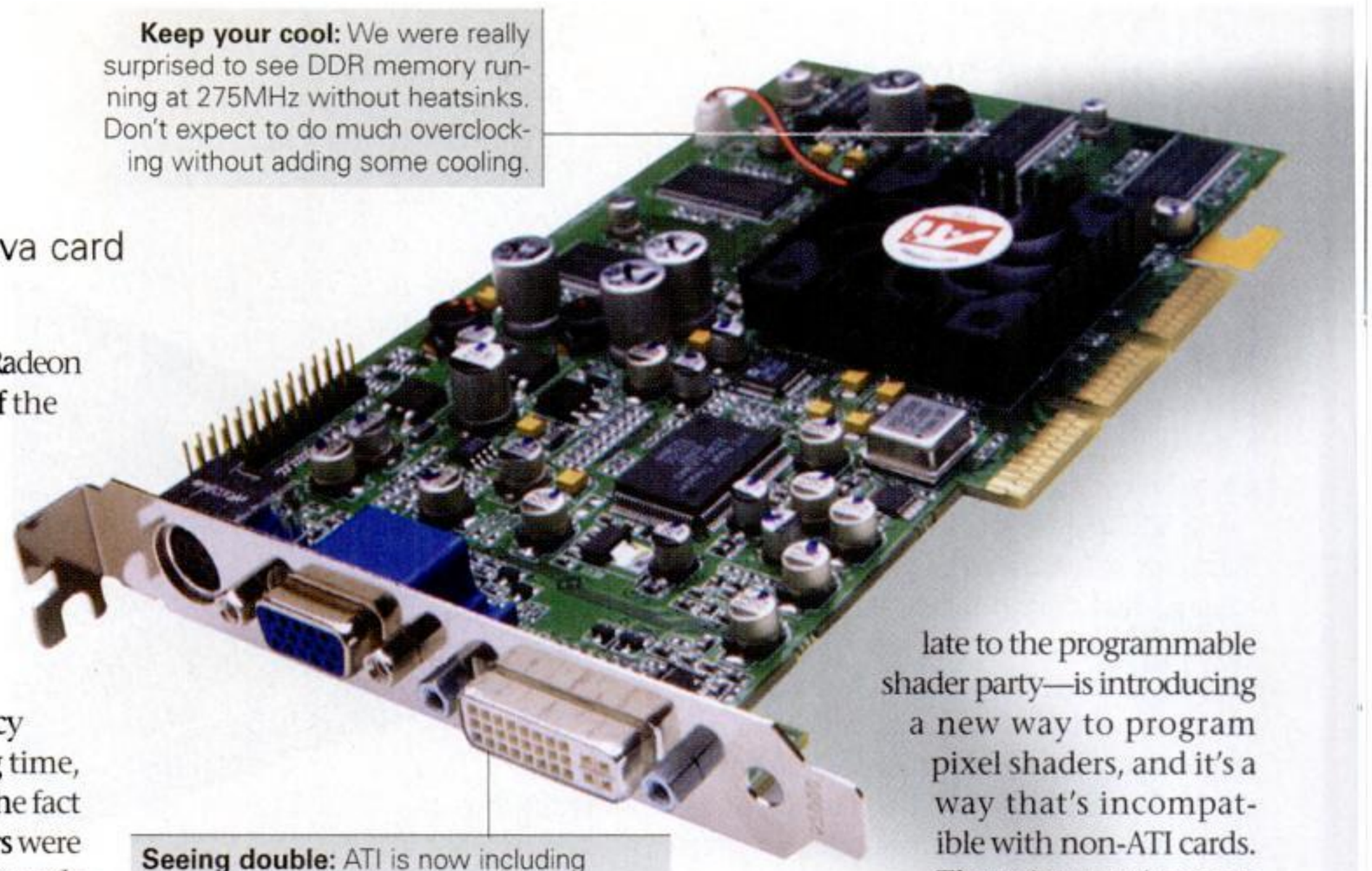
Radeon 8500

ATI's drivers scare us, but this is one helluva card



Keep your cool: We were really surprised to see DDR memory running at 275MHz without heatsinks. Don't expect to do much overclocking without adding some cooling.

Seeing double: ATI is now including support for Hydravision, its multiple monitor setup, on all new Radeon boards, including the 8500.

We really liked the original Radeon chipset, but for much of the past year, we've been disappointed with the Radeon boards. Not because of image quality (which is great), and not because of performance (which is more than adequate for almost all games). No, we've been frustrated with the frequency of ATI's driver updates. For a long time, there simply weren't any, despite the fact that a large number of Radeon users were screaming for bug fixes for games such as *Tribes 2* and *Asheron's Call*. At press time (late September), the latest public driver for the original Radeon was four months old and getting smellier every day. All this sordid history compelled us to test the drivers for ATI's new flagship board with utmost scrutiny.

The first set of drivers sent to us for review were bumpy, causing crashes in *Max Payne* and *Serious Sam* and terrible visual artifacts in our *Quake III Arena* benchmark. But the final shipping drivers we eventually received fixed these problems. Finally confident that ATI's software was playing ball with us, we were astounded by both the 8500's benchmark numbers and the visual quality of everything we saw during testing.

THE SPECS	
Core	275MHz R200 chip
Memory	275MHz DDR SDRAM
Max res	2048x1536x32

ATI's seemingly gimmicky Trueform technology—which uses the lighting data associated with each vertex to apply round curves to models where appropriate—has made a difference in the animation of models. It's especially visible when you look at the wings of the dragon in the *3DMark2001* Game 2 benchmark, and anywhere else where vertex mesh deformation is used to animate joints that move through multiple dimensions simultaneously. When compared to the GeForce3, the Radeon 8500 is the clear visual-quality winner, even in games that don't explicitly support the Radeon's new rendering tricks.

MAXIMUM PC KICK ASS PRODUCT

The 8500's stunningly fast 275MHz core and 275MHz DDR memory powered through our *Quake III* demo and *3DMark2001* Game 4 test, beating the fastest GeForce3 by 9.6fps and 4fps respectively (though it must be noted that a looming nVidia driver revision might close this gap). The only blemish on an otherwise perfect benchmark run was a failure to run the *AquaMark* benchmark. Our guess is that there's an incompatibility with the DirectX pixel shader spec *AquaMark* uses and the one the Radeon uses, which brings us to the crux of our gripe with the Radeon 8500.

Each of the cool pixel shader effects that you see in programmable shader games—such as the shiny, reflective bumpmaps included in the *3DMark2001* Nature benchmark—are written using a pixel shader language. In DirectX 8.1, there are three different versions of the language. Both the GeForce3 and the Radeon 8500 understand version 1.2 of the pixel shader spec, which was essentially defined by nVidia and adopted by Microsoft in DirectX 8 because Microsoft didn't have a better spec of its own. But now ATI—some six months late to the programmable shader party—is introducing a new way to program pixel shaders, and it's a way that's incompatible with non-ATI cards. These instructions are defined by the 1.4 version of the pixel shader spec, a version Microsoft should never have approved (in our opinion).

Version 1.4 allows developers to take full advantage of the 8500's more advanced pixel shaders, but it also forces developers to write two different pieces of code—one for the 8500, and one for the GeForce3—in order to accomplish the exact same thing. The upshot is that developers probably won't go to such great lengths, and as a result, they'll default to the lowest common denominator and avoid the more advanced features of either 3D card family. We'll do our best to explain more in next month's Quick Start section.

For sheer speed and image quality, the Radeon 8500 is the best 3D card available today—but boy, oh boy, we're worried about its driver stability. We're giving the Radeon 8500 a 10 verdict, because it wouldn't be fair to ding it for problems that haven't yet occurred. But you can rest assured we'll be watching the card very closely and reporting on snafus, should any arise.

—WILL SMITH

BENCHMARKS	
Quake3 MPC demo	61.0fps
3DMark2001 Game 2 high detail	60.2fps
3DMark2001 Game 4	18.2fps
AquaMark	Didn't run

Benchmarks were run on our 1.3GHz HP Pentium 4 testbeds using the 4.13.7816 ATI driver.

MAXIMUM PC VERDICT

Radeon 8500
ATI TECHNOLOGIES

+ WHAT WE LIKE

Wow, it's fast! And you can connect the board to an HDTV using a common DB-15-to-5 component video cable.

– WHAT WE HATE

ATI's driver history and a fractured pixel shader spec give us the willies. Will all our games play properly in the future?

905.882.2600 www.ati.com
$300

10

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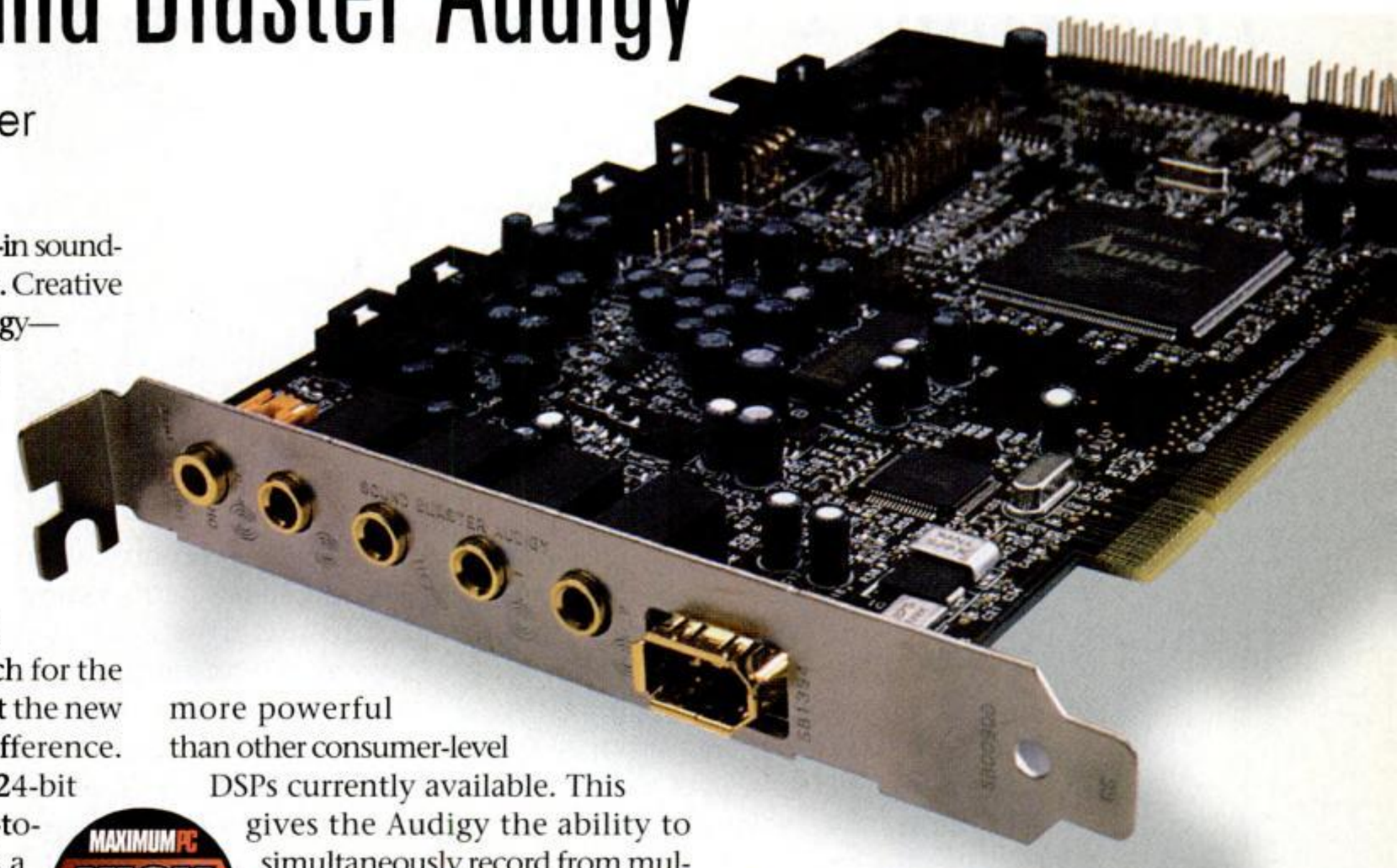
Creative Labs Sound Blaster Audigy

Best sounding consumer card ever

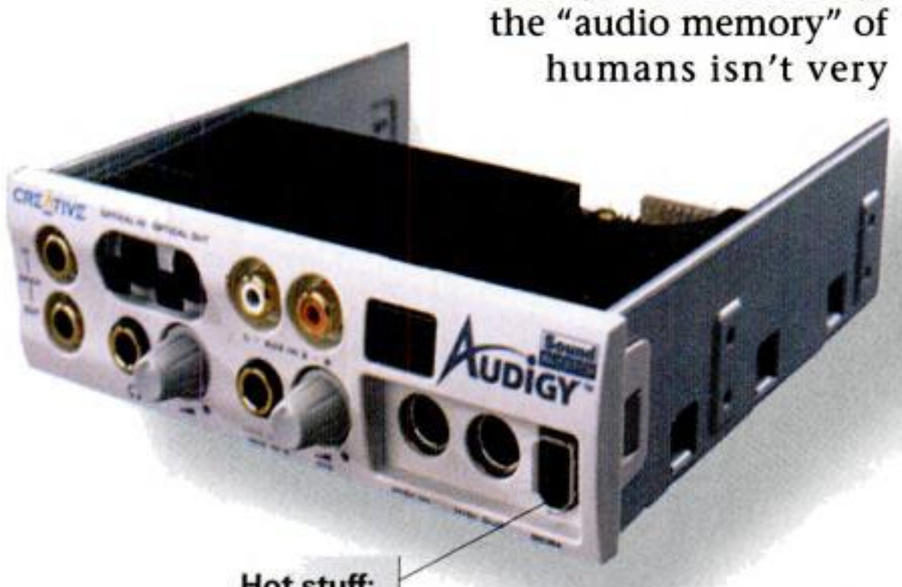


Don't confuse this Sound Blaster Audigy with Creative's previous generation of soundcards, the SB Live!. The Audigy's high-definition audio makes a quantum leap forward in PC audio quality.

If you thought the days of add-in soundcards were dead, think again. Creative Labs' new Sound Blaster Audigy—the heir apparent to the aging SB Live!—proves that full-fledged, PCI slot-bound soundcards can still kick the bejeezus out of those lame chunks of silicon soldered onto most motherboards.

When we originally heard Creative Labs' marketing pitch for the Audigy, we were skeptical that the new features would make any difference. The new sound chip boasts 24-bit digital-to-audio and analog-to-digital converters, as well as a 100dB signal-to-noise ratio. Well, that's just super, Creative, but does anyone really need 24-bit conversion and quieter signals? In fact, people do, and after hearing the Audigy, we had egg on our faces. The Sound Blaster Audigy is simply the best-sounding consumer-level soundcard we've ever heard.

During comparative playback of games, MP3 files, and random WAV files, the Audigy sounded noticeably better than Hercules' Game Theatre XP and the Sound Blaster Live! X-Gamer 5.1. More depth and better clarity. Unfortunately, the "audio memory" of humans isn't very sharp, so you at home may not notice differences between, say, the Live! and the Audigy unless you, too, run comparative tests. Be that as it may, we definitely believe that Creative's claim of "high-definition audio" is more than mere marketing mumbo-jumbo.



Hot stuff: Creative added a FireWire port to its Live! Drive.

The new 10K2 DSP chip at the heart of the Audigy is reportedly four times more powerful than other consumer-level DSPs currently available. This gives the Audigy the ability to simultaneously record from multiple sources, a feature that's typically found only in prosumer cards, such as Echo Audio's Mia, which appeared in this year's content creation Dream Machine (September 2001). For gamers, Creative has introduced several new "EAX Advanced HD" effects, which should make sound effects in games sound that much more realistic (assuming developers take advantage of the technology).

Creative's Multi-Speaker Surround feature (CMSS) uses fancy filtering techniques to redistribute stereo signals across the multiple speakers used in Dolby Digital 4.1 and 5.1 speaker rigs. In the past, we've complained about CMSS for sounding overly filtered and artificial—after all, you can't get blood from a stone, and you can't really get four or five discrete channels from two. With the Audigy, switching on CMSS slightly diminished the total volume pumped out to our Klipsch 5.1 speakers. We prefer stereo-times-two over the filtered audio, but, for what it's worth, CMSS is better than before.

The Audigy Platinum Edition (the version we reviewed) ships with an improved Live! Drive IR that adds a FireWire port alongside the robust mix of usual suspects (see our September 2001 issue Head2Head department for details). The card itself features another FireWire port. We had no problems running a standard mini-DV cam through these convenient interfaces. We've long wished for a USB port in the Live! Drive, but if we had our choice between "free" USB or FireWire support, we'd take FireWire.

Of course, the big question is, Do you really need to upgrade from your existing SB Live! or Hercules Game Theater XP? Probably not. But if you're running onboard audio or building a dream PC from scratch, the Audigy is a no-brainer. Musicians will especially appreciate the realtime time-shifting feature that lets you slow down music without changing its pitch or incurring distortion—a great trick if you want to slow down song tracks to learn solos note for note. The Audigy is the first significant advancement in consumer soundcard technology that we've tested in years, and it's a Perfect 10 if ever there was one.

—GORDON MAH UNG

MAXIMUM PC VERDICT

Sound Blaster Audigy Platinum
CREATIVE LABS

WHAT WE LIKE

High-definition audio makes music and games sound sparkling clear. You get free 1394 support too.

WHAT WE HATE

Creative Labs continues to litter your desktop with applets that pop up all over the frigging place.

800.998.1000 www.soundblaster.com
$200 (external Platinum eX, $250; X-Gamer, MP3+ version, $100)

10

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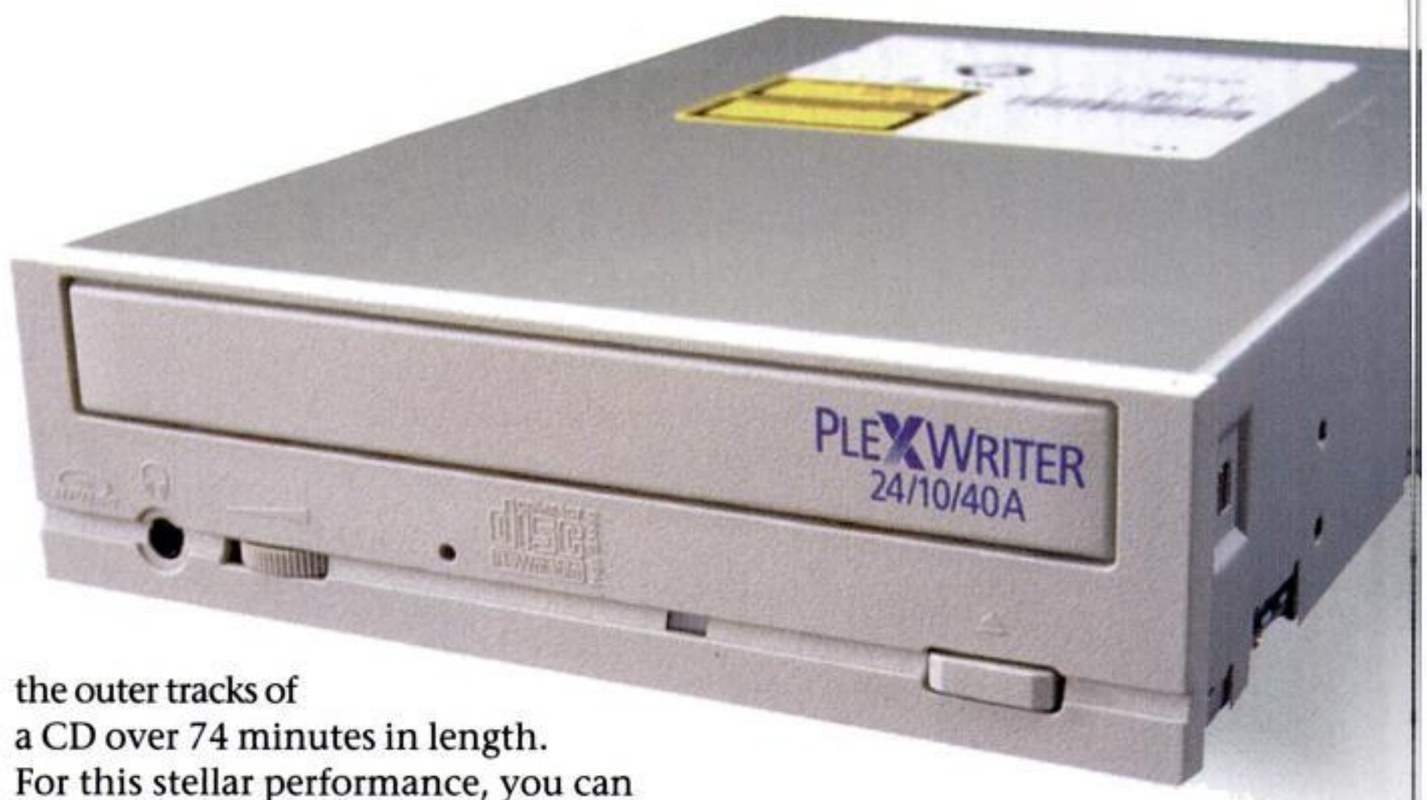
PlexWriter 24/10/40

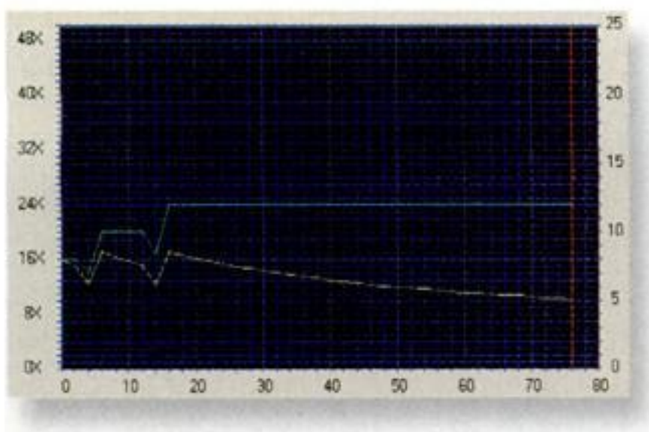
The sexy Plexy makes a triumphant return



Don't let the plain facade fool you—the PlexWriter 24x is the finest CD-RW drive ever to have graced our lab.

We've made no secret of our love for Plextor's PlexWriter 16x. Even when faster optical drives emerged, we stuck with the PlexWriter as our ultimate optical-drive upgrade (August 2001) because of the Plextor's edge-to-edge 16x writing speed, unparalleled accuracy, and flawless support for RAW mode reading and writing. And hard as it is to believe, the best just got better—a lot better.

Oh, we were skeptical at first. Because high rotation speeds can cause excessive vibration, edge-to-edge writing at a consistent 24x performance rating just isn't possible. So in order to hit 24x during any portion of its write process, Plextor has to implement Zone-CLV, which divides the disc into three discrete speed zones during recording. Any misgivings we had over this sleight of hand were erased after we began testing. While the new PlexWriter burned a 647MB disc in a rather logy 4:29 using the bundled *Easy CD Creator*, it actually hit 3:57 when we ran the same test using our own Lab copy of *Nero Burning ROM*—that's nine seconds faster than what the TDK 24x veloCD was able to muster. (Words of wisdom: Your CD mastering app can have a profound effect on burn times.) The Plexy's random and full-stroke access times (108ms and 214ms, respectively) were slightly longer than those of the veloCD, but the drive pulled firmly ahead with its handling of CD-RW, taking just 12:30 to format a rewritable disc and another 6:36 to burn 550MB.



The Plextor 24x reaches 24x speed about 16 minutes into the disc, as indicated by the green line. The yellow line represents disc rotation speed.

Admittedly, these speed gains are minor and certainly less important to us than reliable management of the problems intrinsic to high-speed recording. It's here that Plextor's engineering really shows its mettle. The PlexWriter 24x is the first high-speed drive we've ever tested that passed all of our digital audio extraction (DAE) tests without a single failure, even in the outer tracks of a CD over 74 minutes in length. For this stellar performance, you can credit the drive's PoweRec-II technology, which checks inserted media against an internal database to determine the fastest speed the media can safely handle. While this feature has become common among the latest wave of optical drives, the PlexWriter 24x is the first one we know of that checks media for optimal reading times, as well. For example, after scanning a heavily worn and scratched CD, the PlexWriter successfully ripped the disc by reading at 8x. It's a conservative approach, but one we like. Fast extraction times aren't a thrill if you end up with clicks and pops on your tracks. A pristine 75:27 CD, on the other hand, ripped in an astounding 3:05. Like the TDK 24x, the PlexWriter returned a perfect score on the *Nero CDSpeed* DAE quality test. The critical ears of the *Maximum PC* staff were impressed as well.

The PlexWriter's spit and polish doesn't stop with DAE. The drive is one of the quietest we've ever tested, even when reading at high speed. The PlexWriter also adds a generous 4MB buffer to its Burn Proof support, and its legendary handling of RAW mode copying continues, backing up CD-ROMs that even the 16x PlexWriter couldn't handle. In fact, the only thing preventing the PlexWriter 24x from receiving a Perfect 10 verdict is its bundling of the standard version of Roxio's *Easy CD Creator*. This version lacks power-user features such as overburning support and transition effects for music tracks. And, as stated above, the software couldn't leverage all of the drive's sheer writing power.

We think the TDK 24x veloCD may be a slightly better deal for novices because of its superior installation guide, documentation, and software. But for hardcore users who insist on the best, the PlexWriter 24x is the model of refinement and our new house favorite.

—LOGAN DECKER

THE BUNDLE

Roxio's Easy CD Creator Standard, PlextorManager 2000

BENCHMARKS

Average data transfer (MB/sec)	3.7
Average drive rating	24.92x
Random/full-stroke seek (ms)	108/214
Audio extraction (min:sec)	3:05
Data CD burn (min:sec)	4:06
CPU utilization (at 8x)	6%

The audio extraction test uses a commercially stamped 75:27 minute audio CD. The data CD burn test uses the bundled applications to create a 647MB CD-R. For more information on how we benchmark optical drives, look at the Mag Reprints section of MaximumPC.com.

MAXIMUMPC VERDICT

PlexWriter 24/10/40
PLEXTOR

+ WHAT WE LIKE

Like its older 16x sibling, the PlexWriter 24x has reliability and engineering that's second to none. Using the Plexy, you'd never know there were any problems associated with high-speed recording.

– WHAT WE HATE

The bundling of the standard version of Roxio's *Easy CD Creator* is probably the most awkward pairing since Woody Allen and Soon-Yi Previn.

800.886.3935 www.plextor.com
$290

9

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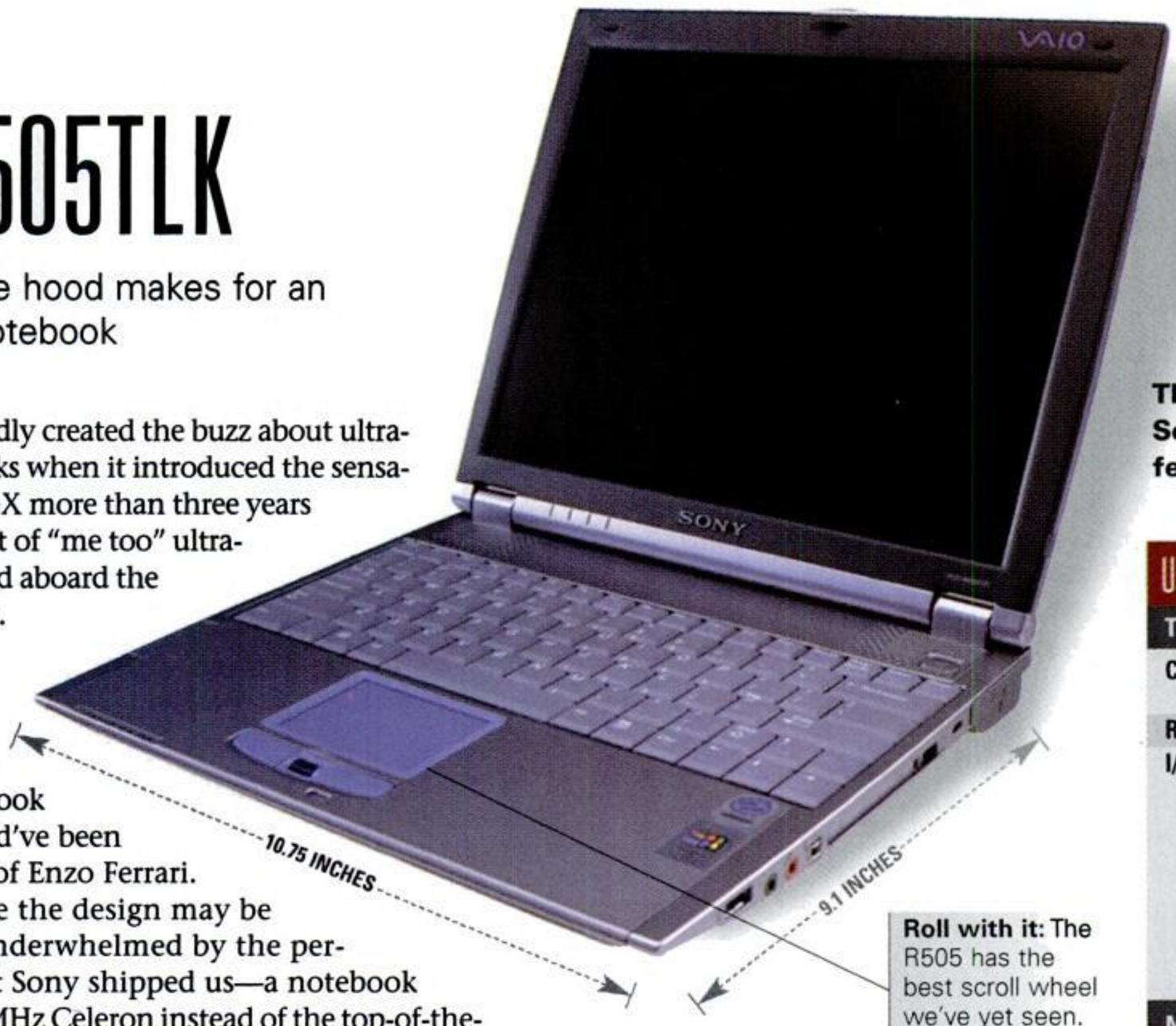
Sony R505TLK

A Cellie under the hood makes for an underpowered notebook



The rakish physique of Sony's R505TLK makes us feel warm and fuzzy inside.

Roll with it: The R505 has the best scroll wheel we've yet seen.

Sony single-handedly created the buzz about ultra-portable notebooks when it introduced the sensational VAIO 505GX more than three years ago. Since then, a host of "me too" ultra-portables have jumped aboard the thin-is-in bandwagon.

With the Sony R505TLK, Sony hopes to fight off the wannabe crowd. This sleek new notebook sports lines that could've been lifted from the desk of Enzo Ferrari. Unfortunately, while the design may be inspired, we were underwhelmed by the performance of the unit Sony shipped us—a notebook equipped with a 650MHz Celeron instead of the top-of-the-mobile-line 850MHz Pentium III. That's like shipping us a Ferrari 308GTB when we expected a Ferrari GTO. We wanted horsepower, and the Celeron just doesn't deliver. Because our review model was loaded with Windows 2000, the machine was unable to complete our standard *SYSmark2001* benchmarking suite. The portion of *SYSmark2001* the notebook did complete, however, showed the Celeron 650 lagging behind an 850MHz P-III by about 33 percent.

Overall, the Sony's scores were back-of-the-pack (as expected), except in *Quake III Arena*. In this test, the notebook's integrated graphics chipset—the Intel 82815—helped pull out a win, pushing the Sony past our zero-point notebook (a Micron Transport GX+ armed with an 850MHz P-III), as well as the Compaq Evo N400c we reviewed in September. The Micron carries the S3 Savage IX video chipset, while the Compaq features the ATI Mobility 4. Still, at 20fps, the Sony's *Quake III* score is nothing to write home about. We don't ding ultra-portables for lacking 3D prowess, because no one should expect to play polygon-intensive games on such small notebooks. These devices are, after all, designed for salarymen on the go. Nonetheless, we're still keeping a candle lit at the window in hopes that an ultra-portable with a GeForce2 Go or Mobility Radeon will find its way home to the Maximum PC Lab.

That stated, we did take offense at the speed of Sony's R505 in our other benchmarks. The notebook was 36 percent slower than our 850MHz P-III reference machine in our Adobe *Premiere* rendering test. In our *Photoshop 6.0* test, the Sony lagged by roughly 31 percent. But that's what one should expect from a Celeron. And for the trade-off in performance, you'll enjoy a tremendous price break. For a mere $1,500, Sony puts you—yes, you—in the driver's seat of the R505. If you prefer WinME over Win2000, the price of the notebook is cut to $1,400. The original 505GX came with a 266MHz Pentium, 32MB of RAM, and a 2.1GB hard drive—and set you back $2,700. We doubt the original could even run our current benchmark suite.

Our favorite feature is the scroll wheel tucked under the glide pad. The wheel gives you the functionality of a wheel mouse and lets you start applications and tab through open windows. Connectivity is standard for an ultra-portable: There are two USB 1.1 ports, onboard Fast Ethernet, a V.90 modem, a single CardBus PC Card slot, and VGA out. Sony dumped IrDA support, but did include a Memory Stick slot. Love it or hate it, Memory Stick is gaining acceptance. A docking bay includes a floppy drive and a DVD-ROM/CD-RW combo drive (for an additional $500). Even slicker, the combo drive is connected via Sony's version of FireWire and burns CD-R discs at 8x. The weight of the docking station destroys the portability of the notebook, as well as battery life. We could play just 73 minutes of our test movie DVD before the battery gave up the ghost.

Overall, our test unit's Celeron performance was blah, so we urge power-users to plunk down for the 750MHz P-III option (for an additional $400). But for people who plan to use only Microsoft *Word* and *Outlook*, the R505TLK is damned attractive at $1,500.

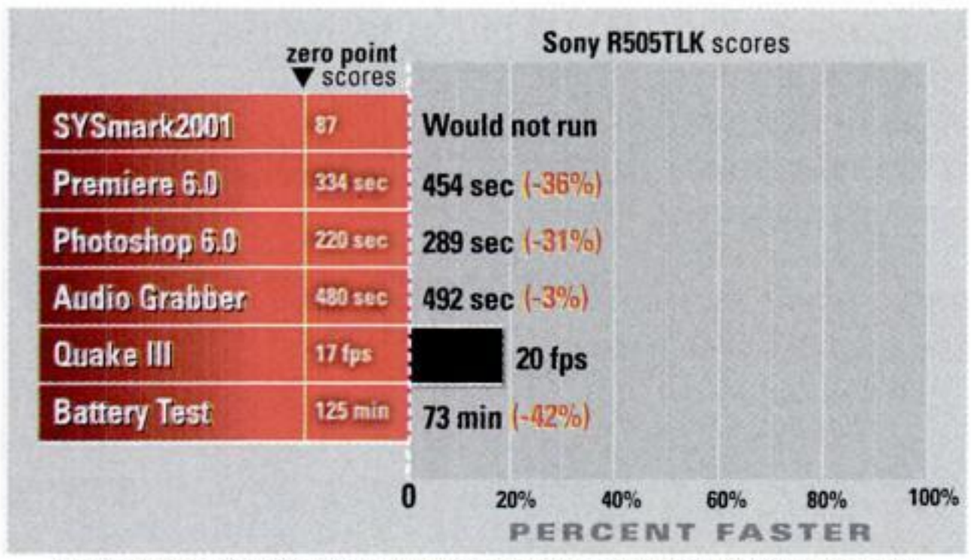
—GORDON MAH UNG

UNDER THE HOOD

THE BRAINS	
CPU	Intel Mobile Celeron 650MHz
RAM	128MB PC100 SDRAM
I/O ports	One CardBus PC Card slot, VGA out, two USB 1.1 ports, i.LINK, mic, headphone, Fast Ethernet, V.90 modem, Memory Stick (docking port offers serial, parallel, VGA out, i.LINK, two USB, 10/100 Ethernet)
NETWORKING	
Modem	Conexant-Ambit 56K modem
LAN	Intel Pro/100 VE
DISPLAY	
Videochip	Intel 82815 Graphics
Display	12.1-inch Active Matrix TFT
Max res	1024x768
STORAGE	
Hard drive	Hitachi DK23BA-15 15GB hard drive, 4200rpm
DVD-CD/RW	Matshita/Panasonic UJDA710 8/4/24/8
SOUND	
Audio chip	Analog Devices AC97 CODEC with SoundMAX
WEIGHT	
Lap weight	3.75 lbs
Carry weight	4.5 lbs
BUNDLE	

Windows 2000 Professional, Microsoft *Word 2000, McAfee VirusScan, VisualFlow 2.0, RealProducer G2, PictureGear 5.0,* ArcSoft *PhotoPrinter 2000 Pro, Drag'n Drop CD, Quicken 2001, MovieShaker,* Intervideo *WinDVD 2000*

BOOT: 49 DOWN: 21



Full benchmarking details in the Mag Reprints section of MaximumPC.com

MAXIMUMPC VERDICT

R505TLK
SONY

WHAT WE LIKE

The sexy lines of the R505 are pure Ferrari, and the price makes it practically free.

WHAT WE HATE

The 650MHz Celeron doesn't pack enough punch, the notebook lacks SpeedStep technology, and the system fan is far too loud when running.

888.595.8246 www.sony.com
$1,500

6

Matrox G550

Did you ever want to be Max Headroom? We didn't either

When Matrox called us with word of a new videocard, we tried to muster some excitement. The PC graphics company hadn't released anything remarkable of late (the last interesting product was the G400, which hit the scene in 1999), and we hadn't heard any buzz about a potential GeForce3-killer from our friends in Quebec. Our enthusiasm only waned when Matrox warned us that the new product isn't a gaming card and shouldn't be reviewed as such. So, when the new card arrived, we entered the Lab with modest expectations—and *still* we were disappointed. The Matrox G550 is basically a G450 with a programmable vertex shader tacked on.

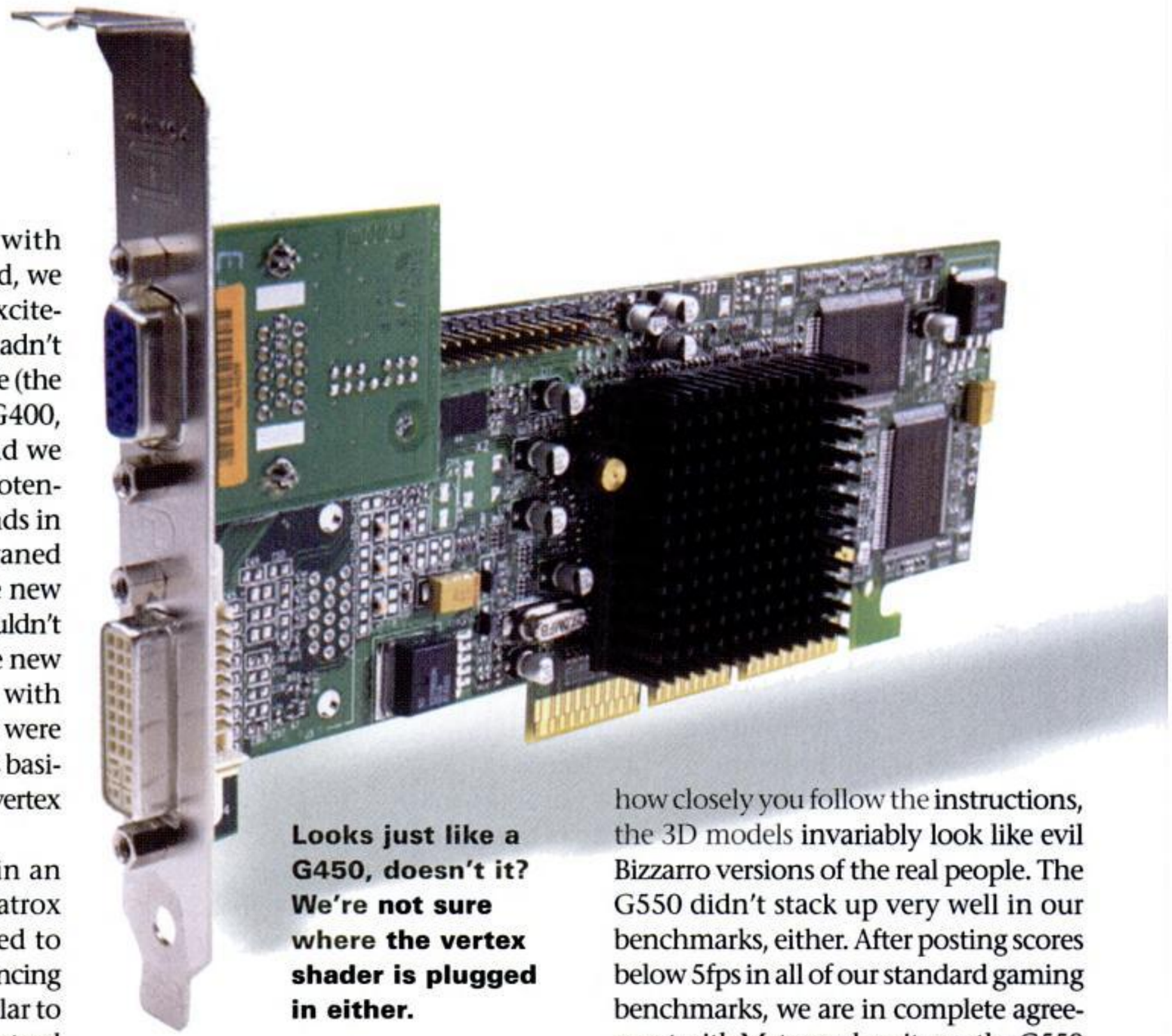
Why include a vertex shader in an otherwise unremarkable card? Matrox says the vertex shader is included to support new "headcasting" conferencing apps. Headcasting software is similar to videoconferencing software, but instead of sending bandwidth-intensive videostreams from one PC to another, it sends audio streams of participants' voices, and displays 3D models of the participants' lip-syncing heads. The models give you something interesting

As if the 3D heads aren't creepy enough on their own, you too can have John Romero's hair!

to look at while you listen to your friends and business partners, but for all intents and purposes, they're nothing more than 3D heads with moving lips.

OK, we know this all sounds pretty silly, but at least Matrox is opening doors to new technology, right? Well, here's the catch: We could find no reason whatsoever why anyone would need a G550 to begin a fruitful life as a headcaster. True enough, the card's bundle includes the headcasting app *HeadFone*—but you can get the software from **www.headfone.com** for $45. And, true enough, the card's bundle includes an application for making a 3D model of your own head—but Digimask will make two free head models for you at **www.digimask.com**. Most disturbingly, during testing we couldn't detect a single difference when running *HeadFone* on a 1.3GHz P4 test bed equipped with a G550, then switching to a 667MHz P-III machine equipped with a GeForce2 MX board. If the G550's vertex shader speeds up lip-syncing frame rates or enables fancy visual effects, these "improvements" were too subtle to notice.

On top of the G550's intrinsic blahness, headcasting itself is downright creepy. Sure, making 3D models of your friends' noggins might be fun for a party gag, but we don't think many people will actually use headcasting for business discussions, or even cybersex—the lip-syncing skulls are simply too disturbing. No matter how closely you follow the instructions, the 3D models invariably look like evil Bizzarro versions of the real people. The G550 didn't stack up very well in our benchmarks, either. After posting scores below 5fps in all of our standard gaming benchmarks, we are in complete agreement with Matrox when it says the G550 isn't a gaming card.



Looks just like a G450, doesn't it? We're not sure where the vertex shader is plugged in either.

So what does the G550 do well? The same things that the G450 and G400 do well. Matrox is still the undisputed master of all things DualHead. Depending on which adapter bundle you choose to buy, the G550 includes either DVI and DB-15 outputs, dual DB-15 outputs, or DB-15 and S-video outputs. As always, 2D image quality is superb on both monitors. The Matrox software DVD player bundled with the G550 produces crisp, clean video.

The bottom line is: If you want to "headcast," buy *HeadFone*. If you want to get a Matrox card, grab a G450 and save yourself a few bucks. The G550 adds nothing more to the predecessor than a software bundle and a virtually useless vertex shader.

—WILL SMITH

RAW DATA

Quake3 MaxPC Demo	3.6fps
3DMark2001 Game 2	4.2fps
3DMark2001 Game 4	Hardware not supported
Aquamark	4fps

MAXIMUMPC VERDICT

G550
MATROX

WHAT WE LIKE

The G550 draws great 2D. And Matrox still does DualHead best.

WHAT WE HATE

We didn't think it was possible, but headcasting both sucks and blows at the same time. Plus, the G550 did absolutely nothing to accelerate our PC graphics experience.

800.361.1408 www.matrox.com
$125

3

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FLIGHTABLE®

The Ultimate Advantage!

For the frequent business traveler.

The best laptop management solution.

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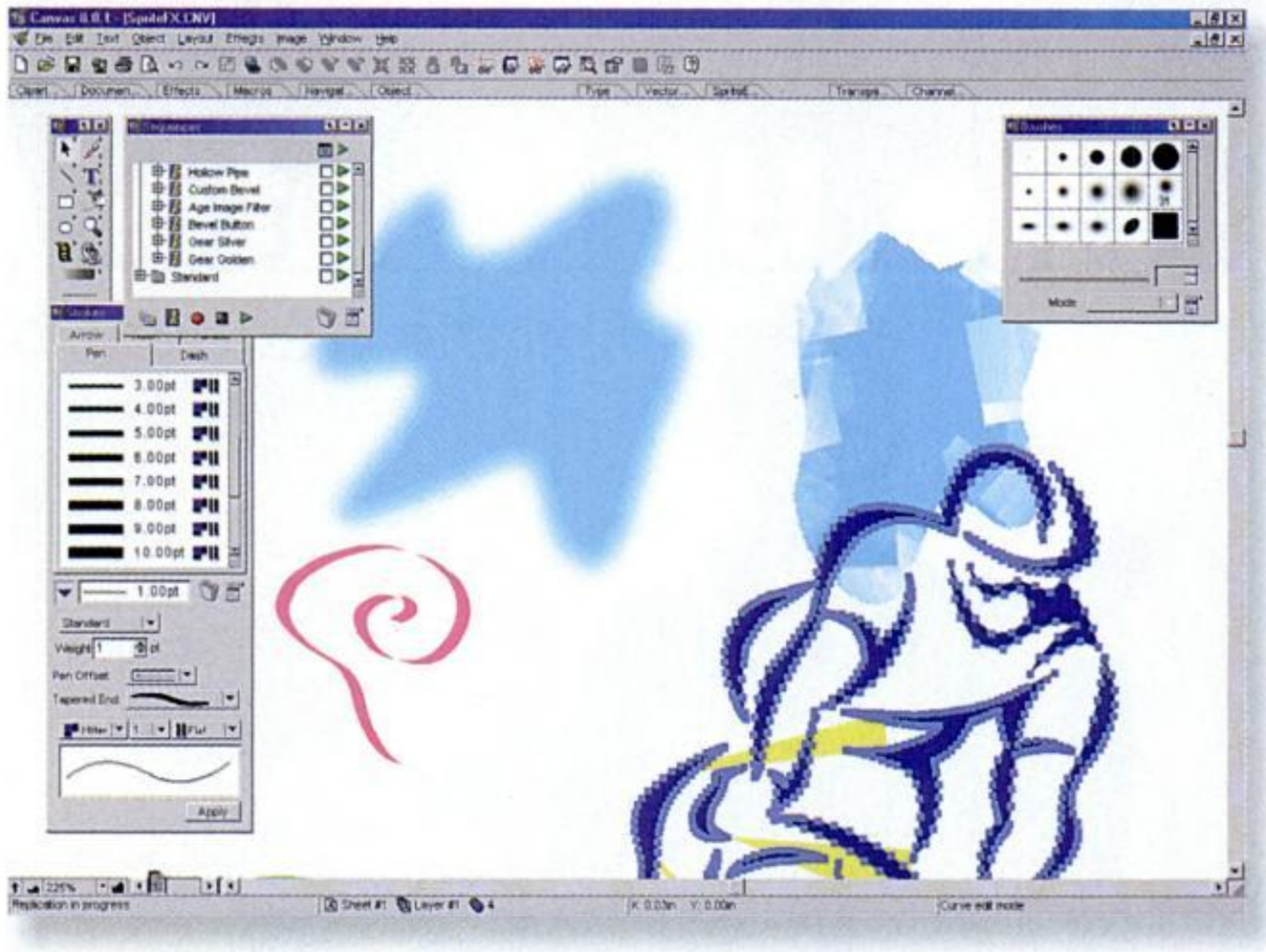
Canvas 8

A vector-based illustration app that does it all—except provide simple interfaces



***Canvas 8* is quick to create vector-based graphics. But for more-complex operations, the tear-off menus, sub-menus, and sub-sub-menus are confusing and complicate the app's workflow.**

Sure, creating shiny 3D robots and sinister 3D landscapes is cool. But graphic designers who want the big bucks know that the *real* killer app of computer artistry is structured drawing.

In any PC-based structured-drawing app, tools that let you create, manipulate, and overlay tons of discrete art objects are key. A good structured-drawing app will import clipart items, apply basic resizing and scaling functions, and execute complex shearing and transparency effects with utmost speed. Most importantly, a good structured-drawing app will offer nearly unlimited control over vector-defined graphics. As opposed to bitmap-based graphics, which are composed of thousands of individual pixels (think of GIF and JPEG image files), vector graphics are based on lines and connecting points. The beauty of vector drawings is they can be scaled from the size of a postage stamp to the size of a wall mural without contracting a case of the jaggies.

Deneba's *Canvas 8* is an ambitious structured-drawing app that can quickly get you working on everything from mundane technical drawings and corporate logos to eye-popping web designs. This kitchen-sink approach doesn't come without a price, however, and *Canvas 8* pays for it with a complex interface and weak import and export features.

One of *Canvas 8*'s strongest improvements is SpriteEffects, an engine that allows image-processing filters to be applied to vector art objects, not just flat bitmaps. This means, for example, that a vector object can be blurred, *then* resized, all without picking up the rough edges typical of a bitmap. This also means that every time you move or manipulate a SpriteEffect object, the effect is re-rendered, which can be a drag on system resources when working with large, complex objects.

For document layout, *Canvas* is surprisingly flexible. It includes a capable kerning feature and a way to "repel" text around any vector layout object. And yes, of course, text can be placed along a curve. In addition to including external scripting support (VBScript, Visual Basic, JavaScript), *Canvas 8* supports a special type of internal macro called a sequence. Sequences apply a recorded set of transformations to an object—which is very helpful if you want to apply the same actions over and over again without resorting to a tedious set of steps. Deneba includes nearly two dozen sequences to do everything from creating an instant drop shadow for any object you select (helpful) to drawing a wooden frame around any art element (ridiculous).

Nobody said all this was easy. Complex applications require complex interfaces, and *Canvas* delves too far into the realm of sub-sub-tear-off menus, and tabs that don't stack properly. There's no shortcut reference card included with the documentation, and it's frustratingly easy to misplace important menus. Unlike Adobe's *Illustrator,* which tends to make most manipulation tools available simultaneously, *Canvas* relies heavily on discrete modes, in which only certain tasks can be performed on an object. For example, you need to re-click an object every time you want to switch from stretching to shearing. This is either a valuable safeguard or a maddening drawback, depending on your work style.

Canvas supports an impressive array of import and export filters, including support for both GIF and Flash animations. We found some obvious gaps, though. PDF import is limited. The app is unable to unlock encrypted PDF documents (even with a password) and tends to turn each page into a single, flat object, rather than identifying the layout elements as it should. PDF export is functional but cursory, and not terribly configurable, and it outputs to the dated-but-serviceable PDF 1.2 *(Acrobat 3.x)* standard.

Despite being touted as the alpha and omega for serious web layout specialists, *Canvas* strangely lacks an HTML import feature. At least *Canvas* lets you load and save directly to an FTP site and fetch individual web images via HTTP. Its HTML export facility supports HTML 4 and XHTML 1, relying on either tables or Cascading Style Sheets (CSS) 2 for complex layout. (Warning: The latter generates pages that don't work in *Netscape 4.x.)*

Canvas 8 is priced comparably to *Illustrator,* so functionality and familiarity have to be your tiebreaker. (Deneba offers a significant discount for the downloadable version of *Canvas.).* Serious artists will appreciate *Canvas*'s powerful tool palette, but its learning curve is Sisyphean.

—JASON COMPTON

MAXIMUMPC VERDICT

Canvas 8
DENEBA SOFTWARE

+ WHAT WE LIKE

It has enough tools for a serious designer, layout artist, or web jockey to start and finish a project. And any company that keeps Adobe on its toes is A-OK with us.

– WHAT WE HATE

The interface hides a lot of useful features in strange places and requires too much fiddling to navigate. Better PDF support would have been nice.

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MechCommander 2

This visually stunning RTS sequel lacks strategic flexibility and finesse

***MechCommander 2* offers endless fighting without the strategy.**

MechCommander 2 is but a shaky improvement over its predecessor. Several of the original game's flaws have been corrected, and the game's new 3D engine looks substantially better than the previous incarnation of three years ago. But problems remain. Does it build online community? Only if you enjoy slaving away for hours on end, creating levels with the complimentary mission editor. Can you plan and execute carefully orchestrated stratagems? Only if you're lucky.

The game is based on the prominent *Battletech* universe, which began 15 years ago as a popular role-playing game before transforming, seemingly overnight, into a hot PC game franchise. As in the first game, you're a commander, essentially a mercenary who orders mechs (giant robots) to fulfill the objectives prescribed by your employer, all in a realtime strategy gaming environment. When you're not blowing the Sam Hill out of anything that moves, you're salvaging enemy mechs, usurping resources from enemy buildings to maintain your campaign, and ordering air strikes during sticky situations. The inclusion of these activities is just one of the ways Microsoft has improved upon the original game.

Was that console behind the house leader built for the game, or is it a public access editing setup?

Unlike *MechWarrior 4,* its sister game, *MechCommander 2* doesn't offer multiplayer features that are just one step away from the single-player mode. Unless you've got the IP address of a friend or you're playing across a LAN, the only way to find an active game is through the Microsoft Gaming Zone, an entirely separate program. Anyone who's dealt with the Zone knows that organizing a game among wishy-washy strangers is both time-consuming and problematic. Even if you manage to get a game up and running, the paucity of maps included (four measly deathmatch maps, and one to two maps apiece for the other game types) makes for scant variation.

When it comes to the single-player campaign, *MechCommander 2* is essentially a *Red Alert* facsimile by way of the *Battletech* universe. Cheesy video footage (seemingly shot at a public access television studio) offers a painfully contrived plotline between missions. Angry warmongers, jailbreaks, and endlessly one-dimensional exposition are just some of the hackneyed elements intended to draw you into giving a damn about the gaming experience. And with its prosaic plotline, *MechCommander 2* suffers a pitfall that has plagued all games based on the *Battletech* universe: It's lacking personality.

As far as physical gameplay elements go, the mouse interface is frequently counter-intuitive and blundering. For example, during a phalanx attack, we had trouble getting four mechs to ensnare a gang of Sha Yus within a mountain pass. Instead of attacking from parallel positions, the suicidal mechs proceeded to walk down the slope and move into the line of fire. At another point, despite repeated mouse clicks, we couldn't even move a catapult away from a very operational turret, and we lost our beloved Meat, a violent laser specialist to whom we had grown attached.

MechCommander 2 scores points for overhauling the original game's interface—it's now a fluid, 3D affair with a tapestry of textures. With a straightforward control system (when it works), the game also provides a happy medium for gamers new to the *Battletech* universe, as well as people who've thoroughly devoured everything else from the franchise. But *MechCommander 2* does little to further the *Battletech* brand. It's a visually striking but nonetheless humdrum game that could have advanced the concept by aiming for the jugular.

—EDWARD CHAMPION

MAXIMUM PC VERDICT

MechCommander 2
MICROSOFT

+ WHAT WE LIKE

The dazzling 3D interface improves upon its predecessor, and the gameplay is designed for both novices and those who like to customize.

– WHAT WE HATE

Lather, rinse, repeat—single-player missions are that routine. Multiplayer mode adds just a little more variety.

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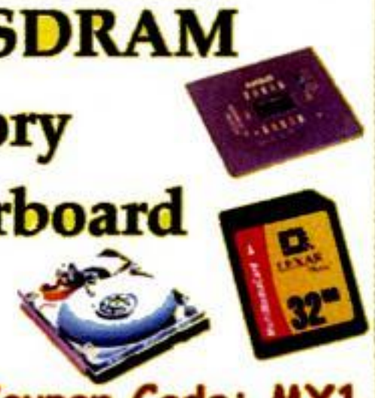

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Snap Judgments

Flawed input, superb wireless, literary ant-ics, and gridiron greatness

Massworks ID-75

If you're always the last person to grab ammo and gear in a game of *Counter-Strike,* or if you've always wished you had an easy way to write macros for games, you might do yourself a favor by grabbing the Massworks ID-75. Featuring a 5.1-inch touch-sensitive, color LCD screen, the ID-75 lets you program a set of virtual buttons that can be used to manipulate macros in any game or application. While the concept is very cool, the execution could be far better. The screen offers poor contrast, and its off-axis viewing is inferior to what people are accustomed to seeing in today's notebooks. The system fan is a tad on the whiny side, too. Still, the ID-75 has incredible potential—if only it just applied itself!

WHAT WE LIKE: The ID-75 lets you forget about those complex key sequences some games and applications require.

WHAT WE HATE: The touch screen's contrast is just awful for the price.

—GORDON MAH UNG

MAXIMUM PC VERDICT: 7

$300, Massworks, www.massworks.com, 800.572.4797

Sennheiser RS 65

These wireless surround-sound headphones threw an impressive auditory uppercut to our jaded ears. Want to talk range? We were able to walk 100 feet away from our computers and still clearly hear the explosions of *The Matrix.* Impressive, sure, but what if we walked into an entirely different room (separated from the audio source by a thick wall), then crouched behind a desk? What would we hear then, hmmm? In fact, we heard a lot—the signal was still clean. While low-frequencies were somewhat muted during testing, treble was particularly dynamic while listening to a Radiohead CD, playing *Unreal Tournament,* and testing Dolby Digital DVDs.

WHAT WE LIKE: The RS 65 offers an incredibly consistent wireless signal, as well as great directional arcs for even the most basic of stereo signals.

WHAT WE HATE: The limited controls prevented us from setting specific bass, treble, and surround levels.

—EDWARD CHAMPION

MAXIMUM PC VERDICT: 9

$200, Sennheiser, www.sennheiser.com, 860.434.9190

Empire of the Ants

Based on Bernard Werber's French novels, *Empire of the Ants* is an RTS with a brain. As the title suggests, you're in command of ants—ants that face hungry grasshoppers, belligerent termites, and natural obstacles that your colony may need to traverse in toto. The level of detail put into this game actually had us weeping when our protagonists bit the dust. While the 3D interface isn't as breathtaking as what you'll find in other strategy games of this caliber, *Empire* presents enough variations within its missions to keep you managing your kingdom with care.

WHAT WE LIKE: The game's engaging premise, majestic orchestral score, and obvious sympathies for the beloved ant go a long way toward offsetting its pitfalls.

WHAT WE HATE: If you're looking for a quick plunge into a unique strategy environment, the game's interface isn't particularly helpful in exposing its many intricacies.

—EDWARD CHAMPION

MAXIMUM PC VERDICT: 8

$40, Strategy First, www.strategyfirst.com, 514.844.2433

Madden NFL 2002

Like toppling all the copies of *Quicken* piled high along the aisles of Costco during tax season, playing the latest *Madden NFL* football sim has become a seasonal tradition. Although the *Madden* franchise actually started as a console port (like many of EA's sports sims), *Madden 2002* offers PC players a few unique bonuses, not the least of which is better graphics, complete with motion-captured movements that mimic the lumbering gait of linemen and the ballet-like leaps of receivers. As in previous versions, *Madden NFL 2002* offers excellent gameplay and literally dozens of plays to suit even the most strategically minded field general.

WHAT WE LIKE: The slo-mo replays and between-downs cutscenes are so beautifully designed and animated, they have the captivating look and feel of a live Sunday afternoon broadcast.

WHAT WE HATE: Where's Madden? His commentaries are few, far between, and often inane—"When you're a receiver, you just gotta catch the ball." Thanks, John.

—ROB PRATT

MAXIMUM PC VERDICT: 8

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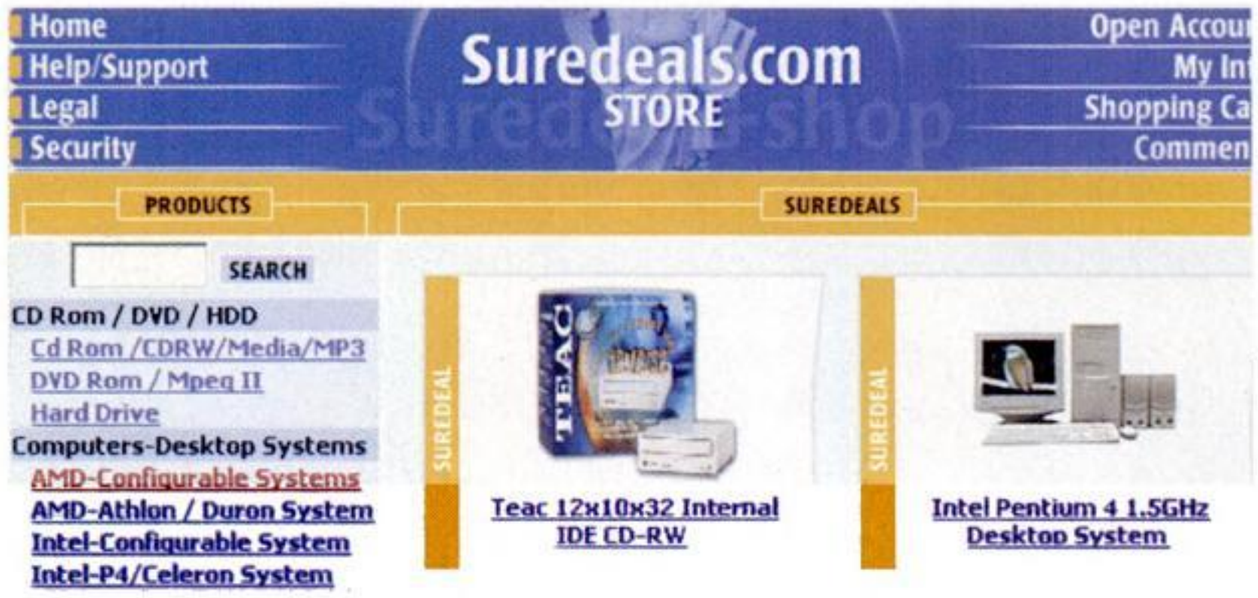

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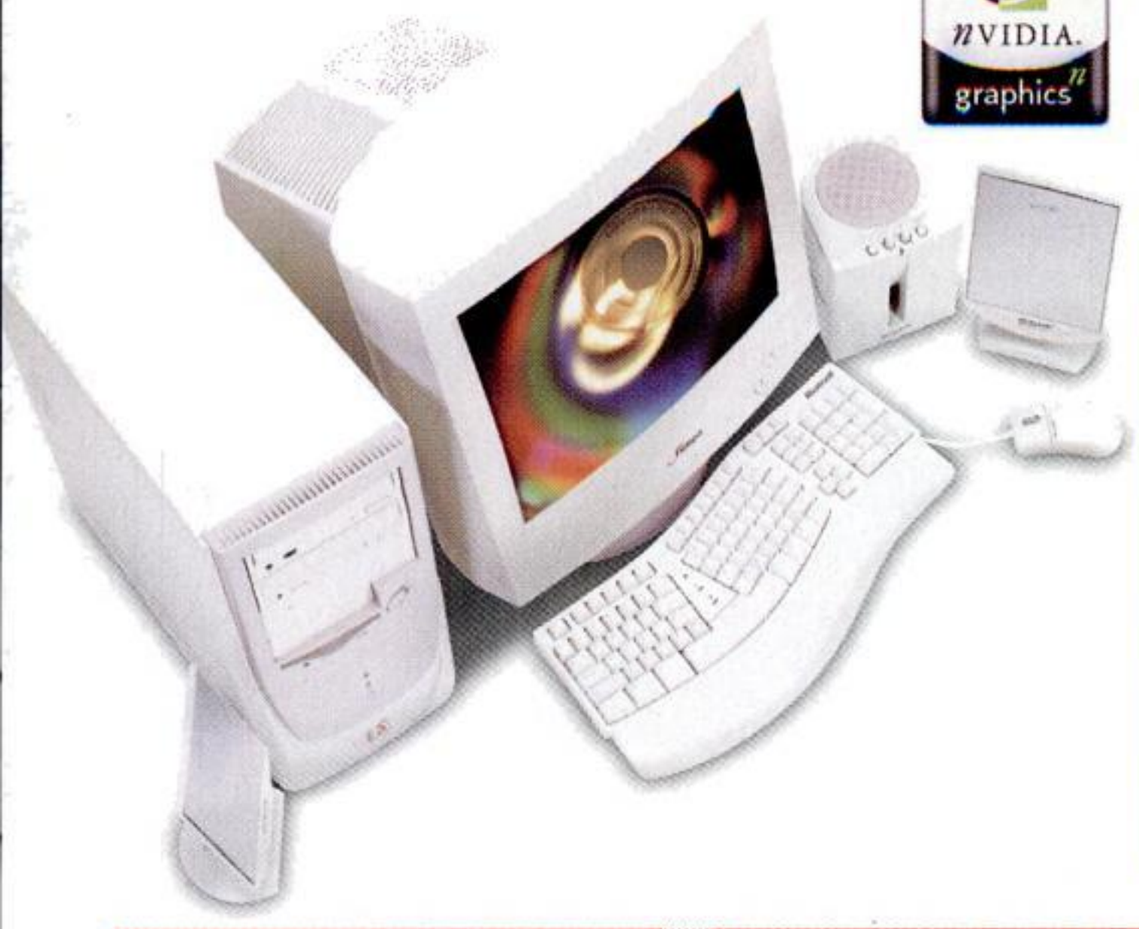

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- 56X CD-ROM Drive
- 1.44MB Floppy Drive
- 56K V.90 Fax/Modem w/Voice
- Integrated Trident Blade 3D Graphics Card
- 3D PCI AC'97 Codec Audio
- Amplifier 14Watts R.M.S. Speaker with Volume Control
- Win98 PS2 Keyboard
- PS2 Mouse
- Mid Tower Chassis with 250Watt UL Power Supply
- Free Bundle with Anti Virus
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$ 359

.....Duron 950MHz # DL950

AMD ATHLON SPECIAL

AMD Athlon SDRAM System

- **VIA KT133A Chipset 4X AGP**
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- 30GB Ultra DMA-100 5400RPM Hard Drive
- 56X CD-ROM Drive
- 1.44MB Floppy Drive
- 56K V.90 Fax/Modem w/Voice
- 32MB Nvidia TNT2 M64 4X Graphics Card
- 3D PCI AC'97 Codec Audio
- Amplifier 14W R.M.S. Speaker with Volume Control
- Multimedia PS2 Keyboard
- Internet PS2 Mouse
- Mid Tower Chassis with 300Watt UL Power Supply
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AMD Athlon DDR System

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- 1.44MB Floppy Drive
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- PC Theater 3D Sound w/ 6-Channel Speaker Support
- Midiland 452 Powered Subwoofer Speaker System with Handy Desktop Control Module
- Multimedia PS2 Keyboard
- Internet PS2 Mouse
- Mid Tower Chassis with 300Watt UL Power Supply
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AMD GAMER DREAM

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- 512MB DDR Memory
- 40GB Ultra DMA-100 7200RPM Hard Drive
- 16X10X40 CD-RW Drive
- 16X Toshiba DVD-ROM Drive
- 1.44MB Floppy Drive
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- 64MB DDR Nvidia Geforce2 Pro Graphics Card with TV-Out
- Creative Labs Sound Blaster Live! Value Sound Card
- Creative Labs Cambridge PCWorks Four Point Surround FPS1000 Speaker /Subwoofer
- Multimedia PS2 Keyboard
- Logitech Cordless Wheel Mouse
- Mid Tower Chassis with 300Watt UL Power Supply
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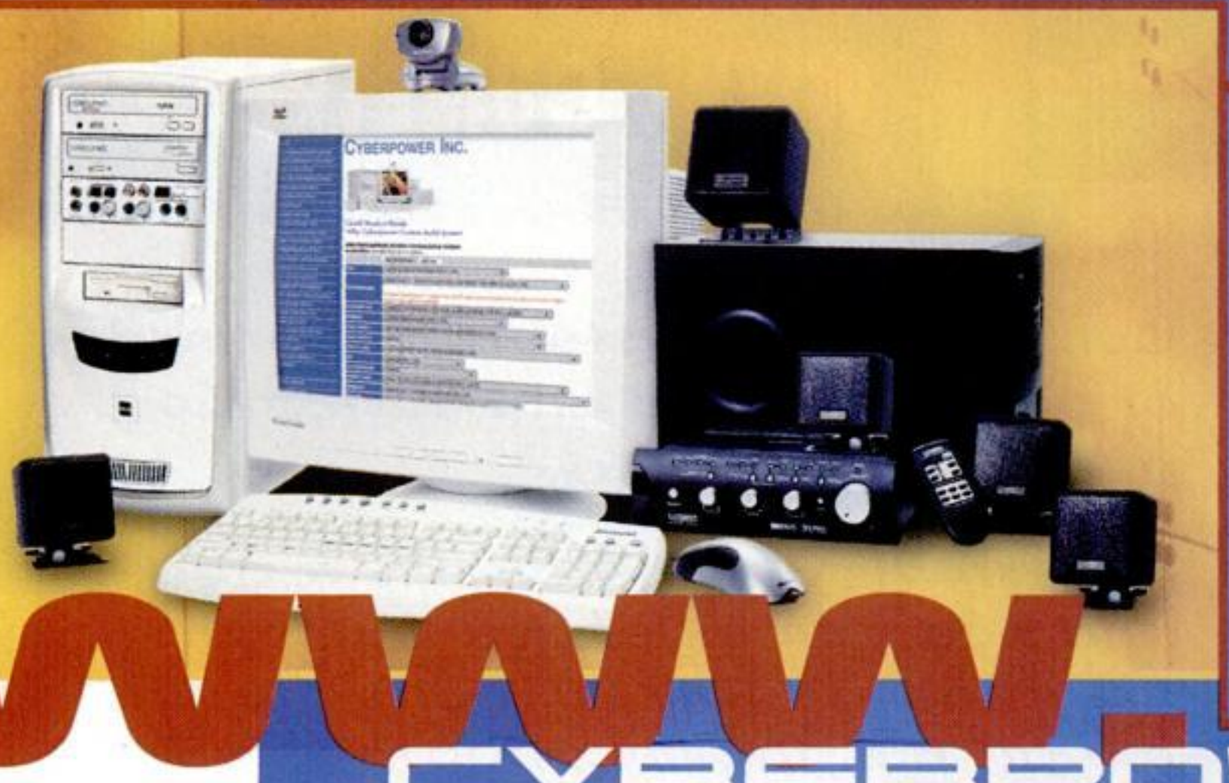

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JUNE 2001 Computer Buyer's Guide Best Buy

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- 40 GB 5400 RPM Ultra UDMA 100 Hard Drive
- Nvidia Geforce–2 MX-400 64MB AGP Video Crad
- 16X DVD-ROM Drive
- 16X10X40 EIDE CDRW Drive
- AC97 3D Wavetable Sound Card
- 450 Watt Stereo Subwoofer Speaker System
- 19" .26MM SVGA Color Monitor
- Zoom 56K V.90 Fax Modem
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Multimedia Keyboard
- PS2 Internet Mouse w/ Wheel
- ATX Medium Tower Case w/ 300 Watt UL
- MS Windows XP or Windows ME
- Corel Wordperfect Office 2000
- Free One Year On Site Service

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AMD ATHLON 1.4GHZ	$ 929	MK112
AMD ATHLON 1.33GHZ	$ 925	MK113
AMD ATHLON 1.2GHZ	$ 915	MK114
AMD ATHLON 1.0GHZ	$ 895	MK115
AMD ATHLON 900	$ 875	MK116

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- Intel I850 Chipset UDMA 100 4x AGP MB
- 512 MB PC800 Rambus Memory
- 60 GB Ultra DMA 100 Hard Drive
- Nvidia Geforce-3 64MB DDR W/ TV-OUT Video Card
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- 16X10x40 CD-RW Drive
- Creative Lab Sound Blaster Live Audigy 5.1
- Creative cambridge SoundWorks Desk Top Theater 5.1 DTT2200 Surround Sound System
- 19" Viewsonic E90 .22MM 1800 x 1500 SVGA
- 3COM US-Robotic 56K V.90 Fax Modem w/ Voice
- Mitsumi 1.44 MB Floppy Drive
- Microsoft PS2 Intelli Internet Keyboard
- Microsoft USB OPTICAL Intelli Explorer Mouse
- ATX Medium Tower Case w/ 300 Watt UL
- MS Windows XP or Windows ME
- Corel Wordperfect Office 2000 or MS Work 2000
- Norton Anti Virus 2001
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Intel Pentium IV 1900	$ 1749	M1112
Intel Pentium IV 1800	$ 1629	M1113
Intel Pentium IV 1700	$ 1575	M1114
Intel Pentium IV 1600	$ 1532	M1115
Intel Pentium IV 1500	$ 1510	M1116

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- 512 MB PC266 PC2100 DDR Memory
- 60 GB Ultra DMA 100 Hard Drive
- Nvidia Geforce-3 64MB w/ TV OUT Video Card
- 16X DVD-ROM Drive
- 16X10X40 CD-RW DRIVE
- Creative Lab Sound Blaster Live Value 5.1 Sound Card
- Creative cambridge SoundWorks Desk Top Theater 5.1 DTT2200 Surround Sound System
- 19" Viewsonic E90 .22MM SVGA Monitor
- Diamond Supra 56K V.90 Fax Modem
- Mitsumi 1.44 MB Floppy Drive
- Microsoft PS2 Intelli Internet Keyboard
- Microsoft PS2 Intelli Mouse w/ Wheel
- ATX Medium Tower Case w/ 300 Watt UL
- MS Windows XP or Windows ME
- Corel Wordperfect Office 2000 or MS Work 2000
- One Year On Site Service +$39

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AMD ATHLON 1.33GHZ	$ 1285	MD113
AMD ATHLON 1.2GHZ	$ 1275	MD114
AMD ATHLON 1.0GHZ	$ 1259	MD115
AMD ATHLON 900	$ 1239	MD116

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- 12x10x32 CDRW Drive
- 16X DVD-ROM Drive
- AC97 3D Wavetable Sound Card
- Altec Lansing ACS 54 Subwoofer Speaker System
- 15" Hyundai L50A Flat Panel LCD Display
- Zoom 56K V.90 Fax Modem w/ Voice
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- PS2 Win98 Keyboard & Internet Mouse
- ATX Medium Tower Case w/ 300 Watt UL
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- Corel Wordperfect Office 2000 or MS Work 2000
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Intel Pentium IV 1800	$ 1309	M1173
Intel Pentium IV 1700	$ 1279	M1174
Intel Pentium IV 1600	$ 1225	M1175
Intel Pentium IV 1500	$ 1185	M1176
Intel Pentium IV 1400	$ 115s9	M1177

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- 40 GB Ultra DMA 100 Hard Drive
- Nvidia Geforce–2 MX-400 64MB AGP Video Card
- 16x10x40 CD-RW Drive
- 16X DVD-ROM Drive
- 19" .26MM 1800 X 1400 SVGA Monitor
- AC97 3D Wavetable Sound Card
- 400 Watt Subwoofer System *Add a Zip Drive $59
- 56K V.90 Fax Modem w/ Voice
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- PS2 Win98 Keyboard & Internet Mouse
- ATX Medium Tower Case w/ 300 Watt UL
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- Corel Wordperfect Office 2000 or MS Work 2000
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Intel Pentium IV 1900	$ 1229	M1122
Intel Pentium IV 1800	$ 1115	M1123
Intel Pentium IV 1700	$ 1059	M1124
Intel Pentium IV 1600	$ 1015	M1125
Intel Pentium IV 1500	$ 995	M1126

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- 16X DVD-ROM Drive
- 16x10x40 CDRW Drive
- AC97 3D Wavetable Sound Card
- Altec Lansing ACS 33 Subwoofer System
- 19".26MM SVGA Monitor
- Zoom 56K V.90 Fax Modem w/ Voice
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Keyboard & Internet Mouse
- ATX Medium Tower Case w/ 300 Watt UL
- MS Windows XP or Windows ME
- Corel Wordperfect Office 2000 or MS Work 2000
- One Year On Site Service +$39

AMD ATHLON 1.5GHZ	$ 935	MH111
AMD ATHLON 1.4GHZ	$ 895	MH112
AMD ATHLON 1.33GHZ	$ 889	MH113
AMD ATHLON 1.2GHZ	$ 879	MH114
AMD ATHLON 1.0GHZ	$ 862	MH115
AMD ATHLON 900	$ 845	MH116
AMD DURON 850	$ 829	MH117
AMD DURON 800	$ 819	MH118

CYBERPOWER BEST BUY

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- 512 MB PC133 SDRAM Memory
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- 16X DVD-ROM Drive
- AC 97 3D Wavetable Sound Card
- 800 Watt Subwoofer System w/ Satellite Speakers
- Zoom 56K V.90 Fax Modem
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Keyboard & Internet Mouse
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Intel Pentium III 1000	$ 615	M1131
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Intel Pentium III 866	$ 565	M1133
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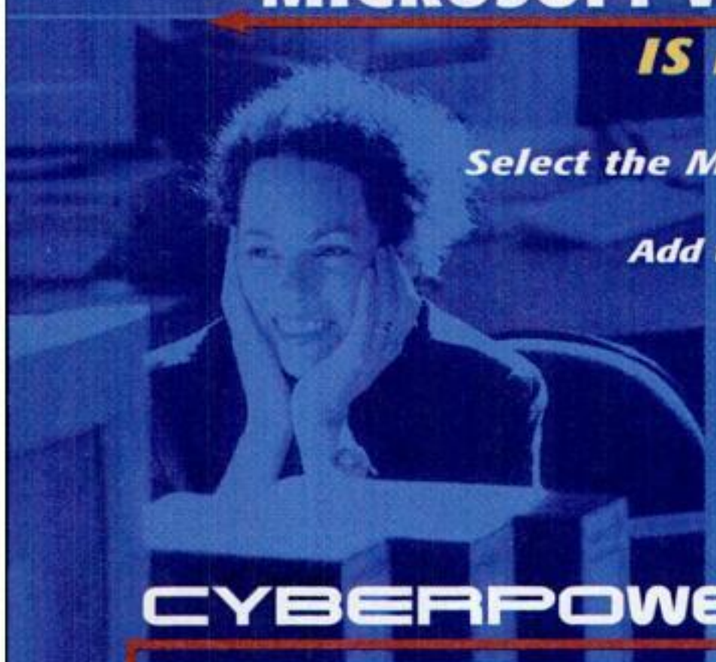

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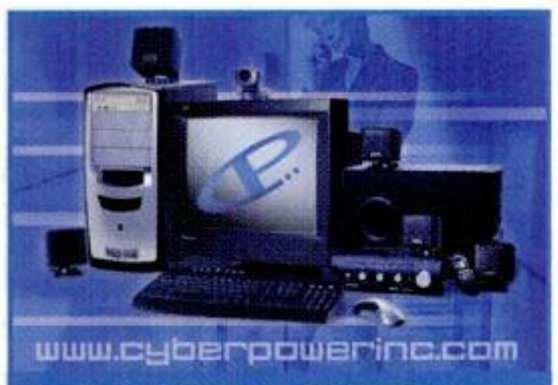

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- PCI 56K V.90 Fax Modem
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AMD ATHLON 1.4GHZ	$ 735	MT112
AMD ATHLON 1.33GHZ	$ 725	MT113
AMD ATHLON 1.2GHZ	$ 715	MT114
AMD ATHLON 1.0GHZ	$ 695	MT115
AMD ATHLON 900	$ 679	MT116
AMD DURON 850	$ 663	MT117

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- 60 GB Ultra DMA 100 Hard Drive
- Nvidia Geforce-2 MX 400 64MB DDR 4X AGP Video Card
- 16X DVD-ROM Drive
- 16X10X40 CD-RW Drive
- Creative Lab Sound Blaster Live 5.1 Sound Card
- Altec Lansing AVS 500 Subwoofer System
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- Zoom 56K V.90 Fax Modem
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Multimedia Keyboard
- PS2 Internet Mouse w/ Wheel
- ATX Medium Tower Case w/ 300 Watt UL
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AMD ATHLON 1.33GHZ	$ 1045	ML113
AMD ATHLON 1.2GHZ	$ 1036	ML114
AMD ATHLON 1.0GHZ	$ 1017	ML115
AMD ATHLON 900	$ 999	ML116

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AMD ATHLON 1.2GHZ	$ 849	MA114
AMD ATHLON 1.0GHZ	$ 835	MA115
AMD ATHLON 900	$ 819	MA116
AMD DURON 900	$ 805	MA117
AMD DURON 850	$ 799	MA118

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- VIA KT-133A 266MHZ FSB 4X AGP MB
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- 16X DVD-ROM Drive
- AC97 3D Wavetable Sound Card
- 450 WATT Subwoofer Speaker System
- Zoom PCI 56K V.90 Fax Modem
- Mitsumi 1.44 MB Floppy Drive
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- 17".27MM SVGA +$155
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AMD ATHLON 1.33GHZ	$ 562	ME113
AMD ATHLON 1.2GHZ	$ 549	ME114
AMD ATHLON 1.0GHZ	$ 535	ME115
AMD ATHLON 900	$ 515	ME116
AMD DURON 850	$ 499	ME117
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- 40 GB Ultra DMA 100 Hard Drive
- Nvidia Geforce-2 MX 200 64MB 4X AGP Video Card
- 8X4X32 CD-RW EIDE Drive
- 16X DVD-ROM Drive
- AC97 3D Wavetable Sound Card
- 450 WATT Subwoofer Speaker System
- Zoom 56K V.90 Fax Modem w/ Voice
- Mitsumi 1.44 MB Floppy Drive
- PS2 Win98 Keyboard & Internet Mouse
- ATX Medium Tower Case w/ 300 Watt UL
- MS Windows XP or Windows ME
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AMD ATHLON 1.33GHZ	$ 665	MJ113
AMD ATHLON 1.2GHZ	$ 656	MJ114
AMD ATHLON 1.0GHZ	$ 639	MJ115
AMD ATHLON 900	$ 619	MJ116
AMD DURON 850	$ 605	MJ117
AMD DURON 800	$ 595	MJ118

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- Nvidia TNT-2 M64 32MB AGP Video Card
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- AC97 3D Wavetable Sound Card
- 120-Watt Power Stereo Speakers
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- Medium Tower Case

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AMD ATHLON 1.2GHZ	$ 449	M1163
AMD ATHLON 1.0GHZ	$ 429	M1164
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AMD DURON 850	$ 395	M1166

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Tyan S1854, 370 & slot 1, ATX $100
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Abit VP6, VIA, U100, Raid 100, $157
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Abit BX133, U100, Raid $136
Abit ST6, i815EP chipset, AGP4x $116
Microstar Pro266, DDR266, VIA $136
Microstar Pro266R, Raid, DDR266, $159
FIC FA11, VIA, U100 $86
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Tyan S2507D Dual 370, AGP4x $114

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IBM 40 gig U100 7200 rpm, $128
IBM 60 gig U100 7200 rpm, $180
IBM 75 gig U100 7200 rpm, $255
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ATI All In Wonder Radeon DDR $ 212
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ATI Radeon VE 32 meg DDR Dual Display $87
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Processors

Intel P4 - Socket 478	AMD Athlon T-Bird
P4 2.0G $628 no ram	1.4G 266FSB $129
P4 1.9G $412 no ram	1.4G 200FSB $134
P4 1.8G $ no ram	1.3G 266FSB $119
P4 1.7G $224 no ram	1.3G 200FSB $119
P4 1.6G $201 no ram	1.2G 266FSb $112
P4 1.5G $179 no ram	1.2G 200FSB $108
Intel P4 - Socket 423	1.1G 266FSB $
P4 1.8G $299 no ram	1.0G 266FSB $99
P4 1.7G $304 256mg	1.0G 200FSB $99
P4 1.7G $213 no ram	950 MHz. $76
P4 1.6G $188 no ram	900 MHz. $69
P4 1.5G $157 no ram	850 MHz. $68
P4 1.5G $ 128mg	AMD Duron
P4 1.4G $188 128mg	1.0 GHz. $102
Intel PIII - Socket 370	950 MHz. $82
P3 1.0 GHz $238	900 MHz. $69
P3 933 MHz. $198	850 MHz. $59
P3 866 MHz. $164	800 MHz. $55
P3 850 MHz. $156	750 MHz. $47
P3 800 MHz. $145	
P3 750 MHz. $144	

Processor Cooling Heatsink Fan Units
CoolerMaster #DP5-6I31 $18, fits all Socket A, 370, 7. Approved by AMD and Intell

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DDR SDram PC2100 (266) by Micron

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256 megs	$45.60	with ECC $50.60

RamBus RDRam
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256 meg 800 MHz $102.00 with ECC $105.60

SDram 168 pin dimms by Micron

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System is assembled and burned in for 48 hours

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AMD T-Bird 1 GHz. - 266 FSB $303
AMD T-Bird 1.2 GHz. - 266 FSB $320
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AMD T-Bird 1.4 GHz. - 266 FSB $341.20
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AMD Athlon and DDR Bare Bones

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ASUS A7M266 Motherboard w/DDR support
DDR SDram PC-2100 by Micron
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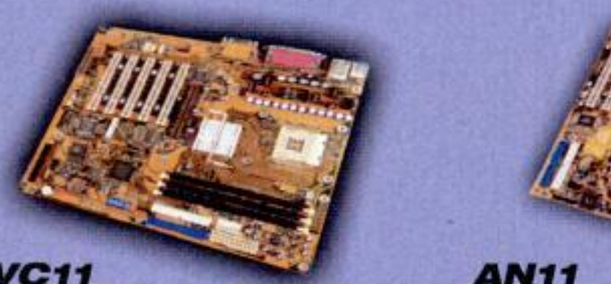

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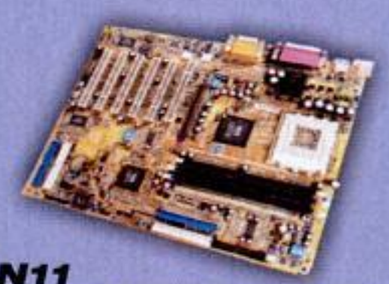

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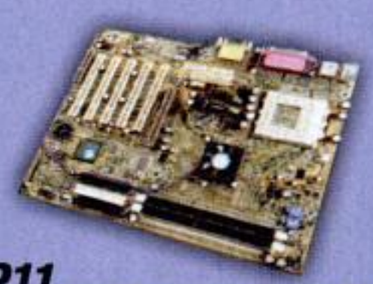

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Computer Shopper Best Buy, April 2001 (6 Times)

Computer Shopper Top 100 Products of the Year, 2000 & 1999

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16x10x40	IDE	Plextor PXW1610TA	$194	$234
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18.4GB	15,000rpm	ST318452LW	8mb	$332
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36.7GB	15,000rpm	ST336705LW	8mb	$550
181.6GB	7200rpm	ST1181677LW	4mb	$1422
IBM				
9.1GB	10,000rpm	07N3220	4mb	★ $182
18.3GB	7200rpm	07N3110	4mb	$262
18.3GB	10,000rpm	07N3210	4mb	$214
36.9GB	7200rpm	07N3100	4mb	$435
36.7GB	10,000rpm	07N3200	4mb	$405

Black Components

COMPUTER CASES

HYDRAULIC Mid Tower w/Window Neon - 300w
$199
(SF860BLKVV)

Antec Full ATX Tower 10 bay 300W
$125
(SX1030B)

NIKAO Mid ATX Silver and Black 300W
$109
(MT2000)

SuperMid P4 Silver w/ Black 9bay 320W
$119
(ATX288BK)

MONITORS

Viewsonic	17"	E70FB	1280 x 1024 - .21	★ $209
Samsung	17"	700IFTB	1600 x 1200 - .20	$299
Viewsonic	17"	G70MB	1280 x 1200 - .23	$245
Viewsonic	19"	E790B	1600 x 1200 - .22	$379
Viewsonic	19"	G90MB	1600 x 1200 - .22	$349
Viewsonic	19"	VP201MB	1600 x 1200 LCD Flat	$3420

Removable Drives

Mitsumi 1.44mb Floppy	$19
Teac or Sony 1.44mb Floppy	$25
LS120 120mb Removable Media Drive	$109
Iomega 100/250MB Zip IDE	$79/$159

SPEAKERS

Altec Lansing		
ATP3, 3 Piece, Thin Profile	30W	$73
ATP5, 5 Piece, Surround Sound	80W	$145
ADA890, 5 Piece, THX	120W	$259
Creative Labs		
CSW1500, 4 point surround	53W	$129
DTT2200, 6 Piece Desk Theatre 5.1	42W	$109
PS2000, 2 Pc Playwork Digital	22W	$175
DTT2500, 6 Pc Desk Theatre Dolby	42W	$213
Sonigistix Monsoon Flat Panel Speakers		
MH500, 3 Piece	51W	$75
MM1000, 3 Piece	50W	$157
MM2000, 5 Piece	340W	$229

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	A7PRO	$124	A7A266	$145
FIC	AD11	$125	AZ11E	$77
GIGABYTE	GA7VTX	$139	GA7ZXR3	$119
	GA7ZXH	$109	GA7DXR	$175
IWILL	KA266	$135	★ KA266RAID	$145
	KK266	$120	KK266RAID	$135
MSI	KM133MPRO	$90	K7T266PRO	$127
	KT7MASTER	$255	K7TTURBO	$115
SOCKET 370 (Flip Chip/Celeron)				
Asus	TUSL2-C	$120	CUV4X-D	$165
	CUSL2	$139	CUV4X-DLS	$330
Intel	D815EFV	$120	STL2	$509
Supermicro	370DL3	$475	370DLE	$320
SOCKET 423 (Pentium 4)				
ASUS	P4T	$190		
GIGABYTE	GA-8TX	$199	GA-8TX-C	$179
INTEL	D850GBC	$170	D850GBCAL	$195
MSI	850PRO	$165		

RED HOT Sellers

Pacific Digital 24x10x40 USB 2.0 CDRW Drive	★ $244
Creative Labs AUDIGY Platinum EX Sound Card	$230
Creative Labs Sound Blaster Live X-Gamer 5.1	$89
Creative Labs Sound Blaster Platinum 5.1 Sound	$175
NMB Dual AMD Power Supply 460W PS2-180 24/8pin	$115
VisionTek GeForce 3 64MB DDR 4x AGP	$359
Iomega Peerless USB Removable w/20GB disk	$370
24x10x40 IDE Internal TDK VeloCD 241040	$234
Antec SX1440B Black 14bay 400watt server case	$439
Home Theater 8x DVD, 933mhz, 128mb, 40GB	$799
TDK 24x CDR, 80min, 30pack spindle media	$28
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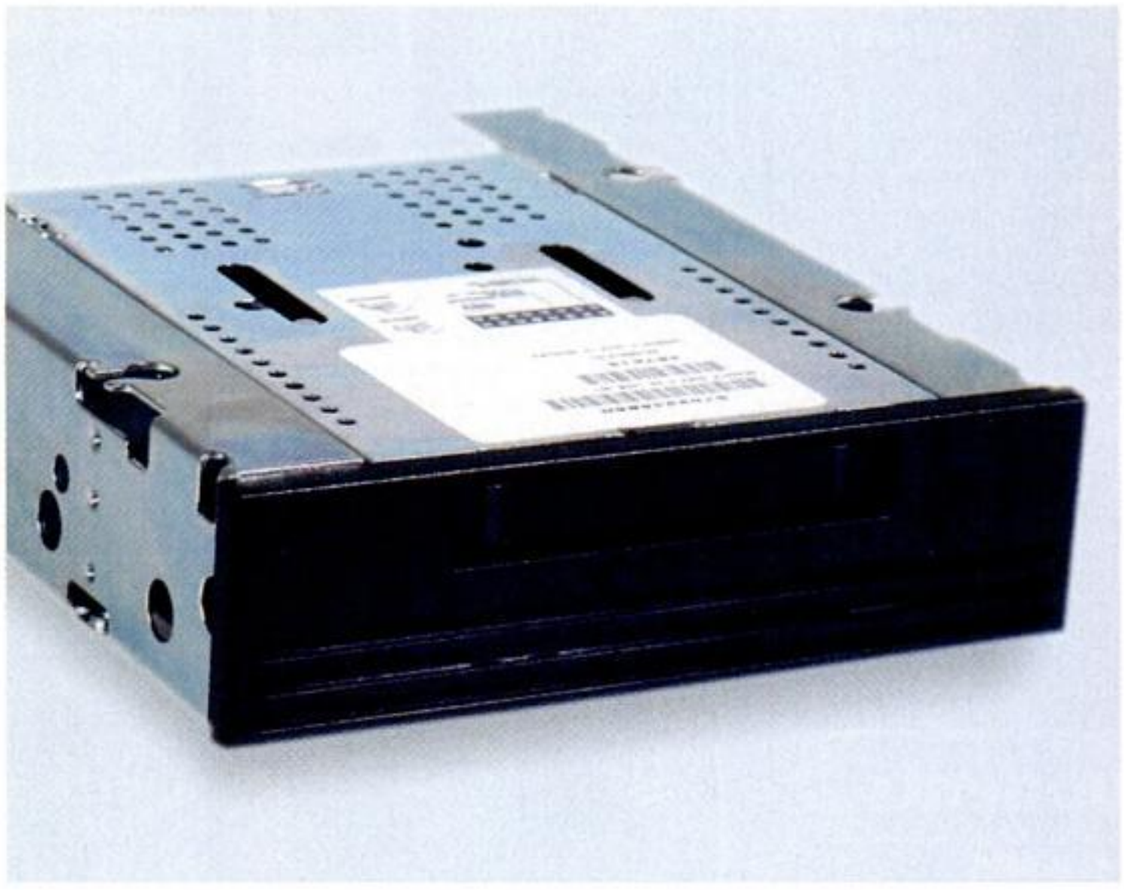

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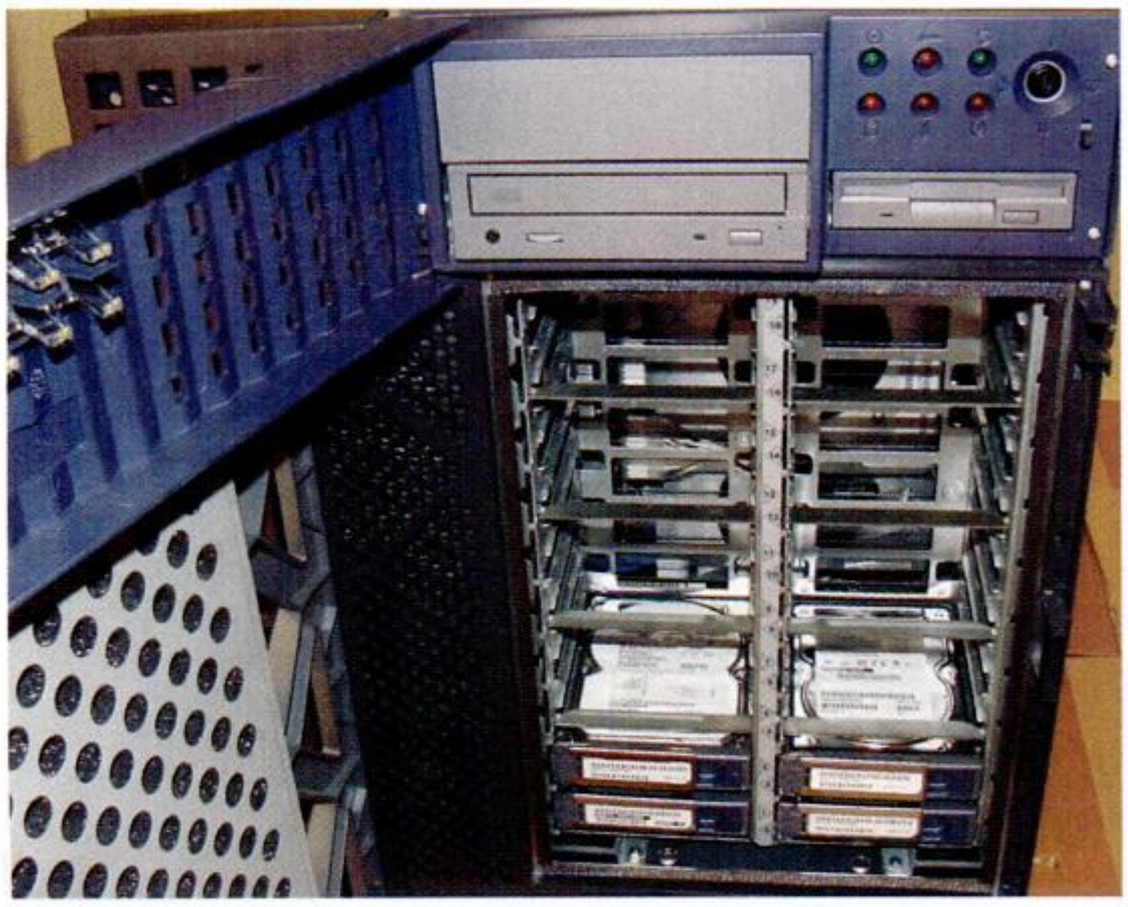

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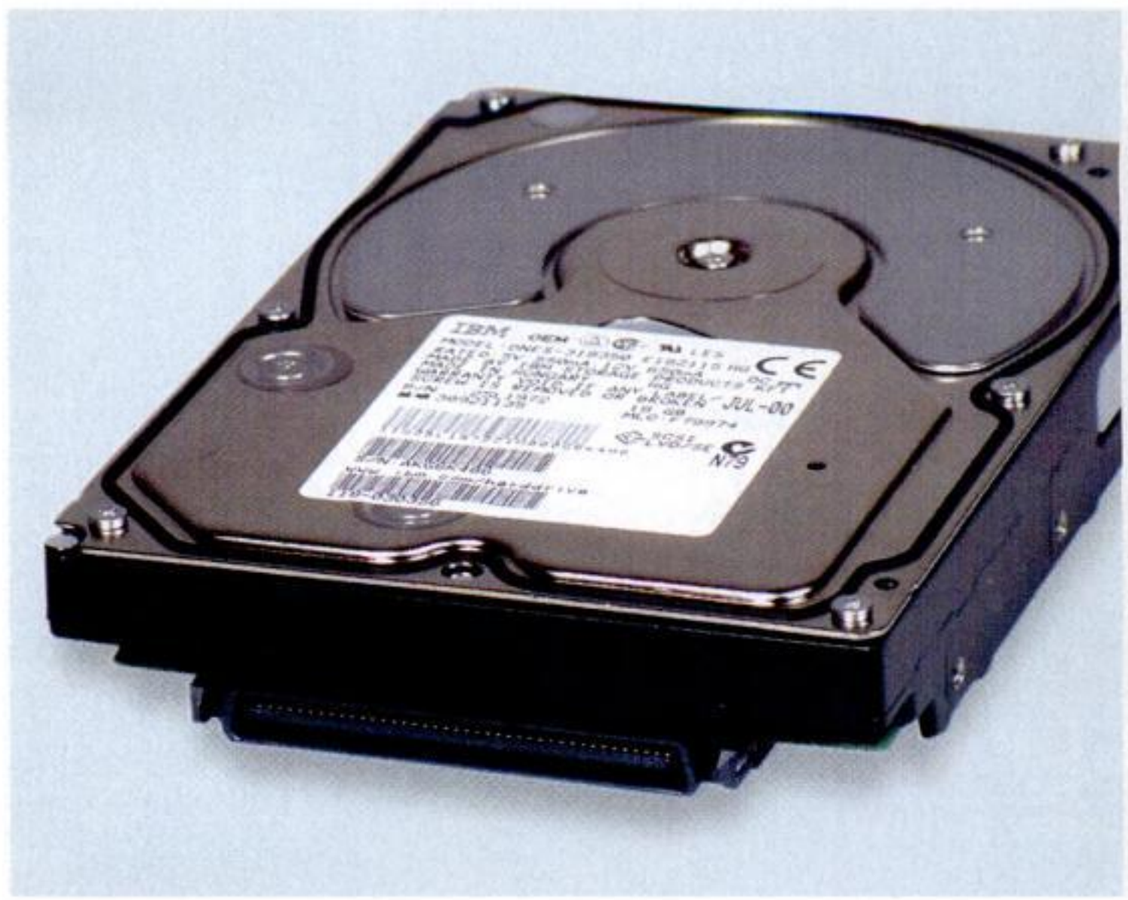

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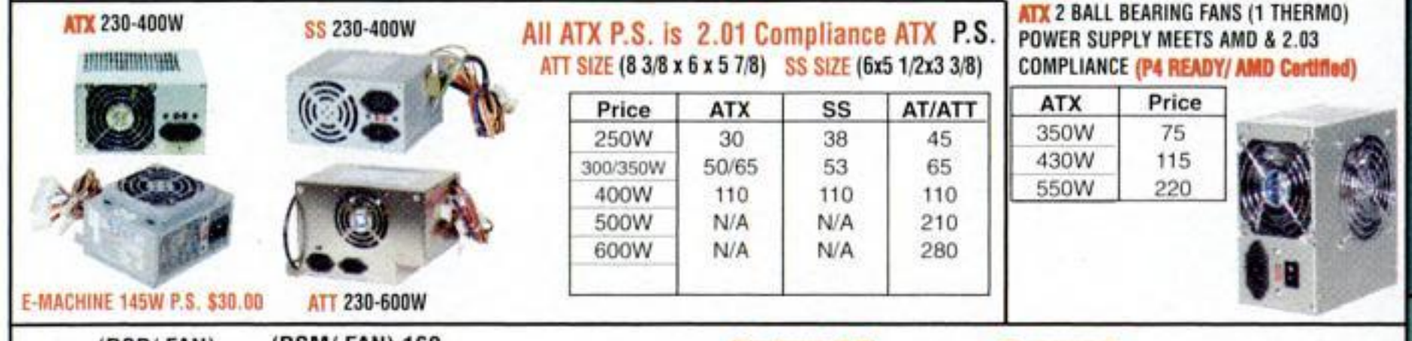

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MODEL/ SPECS	Bare Bone	Dimension W.D.H	I/O ports	5.25"	3.5"	PCI	PCI ISA
105LPX socket 370	255	12x13x3.1	PS2 KB,mouse,VGA,USB,RJ45 2S,1P,AUDIO, GAME	1	1/1	3	or 0
105LPX TV	275	12x13x3.1	PS2 KB,mouse,VGA,USB,RJ45 2S,1P,AUDIO,GAME,TV	1		3	or 0
109NLX socket 7	175	12.3x16x3.9	PS2 KB,mouse,VGA,USB,RJ45 2S,1P,AUDIO,GAME, IR	1	1/1	2	1
111M.NLX 370	260	11.5x10.6x2.5	PS2 KB,mouse,VGA,USB,RJ45 2S,1P,AUDIO, GAME,1394	w/slim CD	0/2.5 HD	2	or 0
192 M.ATX 370	185	13.8x16.5x3.4	PS2 KB,mouse,VGA,USB,RJ45 2S,1P,AUDIO,GAME	1	1/1	3	or 0
192B M.ATX 370	185	13.8x16.5x3.4	PS2 KB,mouse,VGA,USB,RJ45 2S,1P,AUDIO,GAME	1	1/1	3	& 0

Case Specification & Price List

Model	Price	Dimension W.D.H.	MB Size	5.25 Ext./Int.	3.5 Ext./Int.	P.S.
R02/BARE	180/300	19x17.6x3.5	M.ATX	1/0	1/1	150W
R04B/W	275	19x24.3x3.5	ATX	1/0	1/3	250W
R05B	430	19x242x3.5	ATX	1/0	1/4	430W
R06B	250	19x20.2x5.25	ATX	4/0	1/5	300W
R08 B/W	1550/1800	19x22x3.5				
R10 B	175	19x17x7	ATX	3/0	1/1	300W
R14 B/W	215	19x21x7	ATX	3/0	1/3	300W
R15	295/510	19x24.4x7	ATX	6/0	2/2	300W
R16 B/W	225	19x18x7	ATX	3/0	1/2	250W
R17 B 4U	215	19x21x7	ATX	3/0	1/2	250W
R20 B/W	275	19x20.5x7		8/0		300W
R21 B/W	275	19x18x7		8/0		300W
R22R/B/W	635/950	19x23.3x10.5	ATX	8/0	1/0	300W/R
R26R/B/W	630/850	19x22.6x10.7	ATX	4/0	2/4	300W/R
R28	290	19x17x8.7		8/0		300W
RSP	18	5.8x9.3x1.6			1	
RSM169-100	65/75	5.8x9.3x1.6			1	
001B	75	10x11.5x3		1/0		60W
001B1	65	8.3x10.6x2.8		1/0		50W
002B	88	6.9x14.6x5.8		2/0		60W
002B1	78	7.5x11.2x6.5		2/0		80W
004B	105	6.8x15.3x9.3		4/0		230W
004B1	100	7.5x17.3x10.2		4/0		200W
007B	180	7x15.8x13		7/0		250W
008B	280	8.4x20.2x18.3		8/0		300W
008B1	180	7.5x17.9x17.1		8/0		250W
105LPX/TV	255/275	11.9x12.6x3	LPX	1/0	1/1	90W
109(SP 98) bare	175	11x12.3x3.9	NLX	1/0	1/1	135W
111N bare	260	11.6x10.6x2.5	M.NLX	1/0	0/1	100W
192M.ATX/B	85	13.1x16.5x3.5	M.ATX	1/0	1/1	150W
224	75	17.4x18.8x6.1	ATX	3/0	2/2	230W
267	70	16.8x16.8x6.2	ATX	2/0	2/1	250W
271	85	17.3x15.9x5.5	ATX	2/0	1/1	250X
288	75	16.9x17x6	ATX	3/0	2/1	230W
304	55	7.9x18.8x13.9	ATX	3/0	2/1	300W
325B	55	8x18.5x17	ATX	3/0	2/1	235W
327	72	7.5x16.5x17.3	ATX	3/0	2/2	230W
337	75	7.8x18.8x16.5	ATX	3/0	2/2	300W
338	55	7x14.7x13.8	M. ATX	2/0	2/1	145W
366	50	7.2x15.5x14.3	M. ATX	2/0	1/1	235W
367	55	7.7x16.5x17	ATX	3/0	2/1	235W
370	80	8.3x17.3x16.1	ATX	3/0	2/2	250W
392	80	7.5x17x17	ATX	3/0	2/2	250W
393	90	9x17.5x17.5	ATX	6/0	1/1	250W
396	55	8.3x17x15.5	ATX	3/0	1/3	230W
401	110	8.5x17.3x18	ATX	2/0	2/2	250W
405B	75	7.8x17.5x17.2	ATX	4/0	2/2	320W
408	80	8.2x19.8x18.4	ATX	3/0	1/5	250W
409	295	9.5x22x18.1	ATX	4/0	2/5	300W
411	67	7.2x17.2x16.8	ATX	4/0	2/1	250W
412	67	7.2x17.2x16.8	ATX	4/0	1/2	250W
413S/BL	67	8.5x19.5x18	ATX	4/0	2/1	250W
415	75	8.8x19.5x19.7	ATX	8/0	1/0	300W
418B/W	115	8.1x18.8x21.4	ATX	4/0	2/4	300W
422	70	7.7x16.6x18.1	AT	4/0	1/4	250W
424	70	7.5x18.9x16.7	ATX	4/0	2/1	250W
426B/W/S	70/75	7.5x17.5x19.3	ATX	3/0	2/2	250W
427	75	7.5x16.5x17.3	ATX	3/0	2/2	250W
436	70/85	8.6x18x15.6	ATX	3/0	2/2	250/300W
442	60	8x18.25x16.3	ATX	4/0	2/1	300W
455	110	8.5x17.5x18.6	ATX	4/0	2/3	250W
465	185	9.3x17x17.2	XEON/ATX	2/0	2/2	300W
467	75/90	7.5x16.7x18.8	ATX	3/0	1/4	250W/300W
470	110	8.3x17.3x21.3	ATX	4/1	1/2	250W
471	110	8.4x17.5x21.3	ATX	3/1	1/4	250W
472	60	7.5x18x17.6	ATX	4/0	2/2	250W
474	285	7.8x17.2x17.2	ATX	4/0	2/2	300W
476	70	8x17.2x17	ATX	4/0	2/2	300W
478	155	7.9x18.4x16.4	ATX	4/0	2/1	300W
479	155	7.9x18.4x16.4	ATX	4/0	2/1	300W
480	195	7.8x18x16.5	ATX	4/0	2/1	300W
482B	80	7.8x19.8x17.5	ATX	4/0	2/2	250W
486	67	9.6x19.5x17	ATX	4/0	2/1	250W
489**	80	7.3x17x17	ATX	3/0	1/2	235W
492	229	8.3x17.5x17.6	ATX	4/0	3/5	300W
493B	234	8.3x17.5x17.6	ATX	4/0	3/5	300W
496	60	8.25x17.8x16.5	ATX	4/0	1/3	250W
501	155	8.25x17.2x23.8	ATX	4/0	2/4	300W
503R/B	455	14.8x20.4x18.4	ATX	8/0	2/4	300RW
503/B	295	14.8x20.4x18.4	ATX	8/0	2/4	300W
505	555	14.6x23x26.8	ATX	12/0	1/8	300W
505R	670	14.6x23x26.8	ATX	12/0	1/8	300RW
506/R	155/370	7.8x16.5x24.4	ATX	6/0	2/2	300W/R
518	145	8.1x18.5x26.5	ATX	6/0	2/6	300W
524	380	13.9x25.6x19.1	ATX	7/0	1/2	300RW
526B/W	105/120	7.5x17.5x24.5	ATX	6/0	1/4	250W/300W
528	95/110	7.5x16.5x24.8	ATX	6/0	1/5	250W/300W
536	93/108	7.8x17x24	ATX	5/0	1/5	250W/300W
538	290	8x20.5x24.5	ATX	5/0	1/6	300RW
560/R	290/445	15x24.5x23.5	ATX	11/0	2/4	300W/300R
562/R/B/W	250/470	8.7x17.9x26.8	ATX	9/1	1/0	300W/300R
563/RB/W	145/370	8.7x17.9x26.8	ATX	10/0		300W/300R
565	185	9.25x18.3x21.2	XEON/ATX	4/0	2/4	300W
568	95/110	7.5x17x22.8	ATX	5/0	2/4	250W/300W
569B/W	210	13.5x17.8x14	B/ATX	6/2	0/8	300W/300W
570/R	150/370	8.3x17.3x26.4	ATX	7/1	1/2	300W/300R
571/R	160/370	8.3x17.3x26.4	ATX	6/1	1/2	300W/300R
582	105/120	7.8x16.5x23.2	ATX	6/0	2/1	250W/300W
588	99/114	7.8x16.5x23.3	ATX	5/0	1/3	250W/300W
1620/R	950	16.5x20.3x34.3	F/ATXx2	16/0		300R

Model# Starts with:
1 for Slim Case
2 for Desktop Case
3 for Mini-Mid Case
4 for Mid Case
5 for Full/File Server Case

*Case Color: Blue, Purple, Green, Orange, Red.
**Case Color: Blue, Purple, Green, Red, Black.

Side Open: Side Panel can be removed independently
Slide Door: Sliding front door up and down
Slide MB Plate: Motherboard tray ca slide in and out form rear

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R= REDUNDANT POWER SUPPLY WITH HARDSWAP
250XB= Ball Bearing

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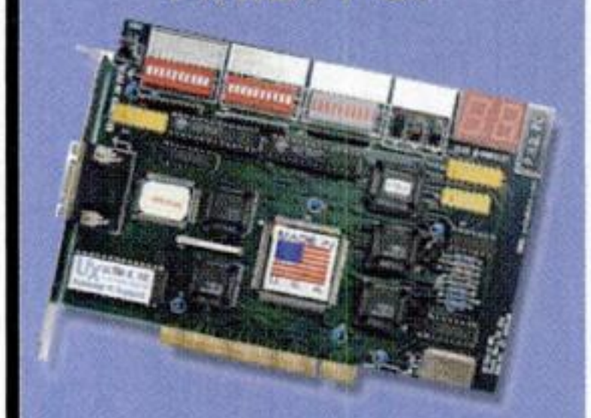

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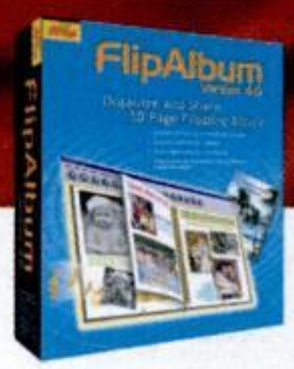
Contra Costa Times CA, 1 August 2001



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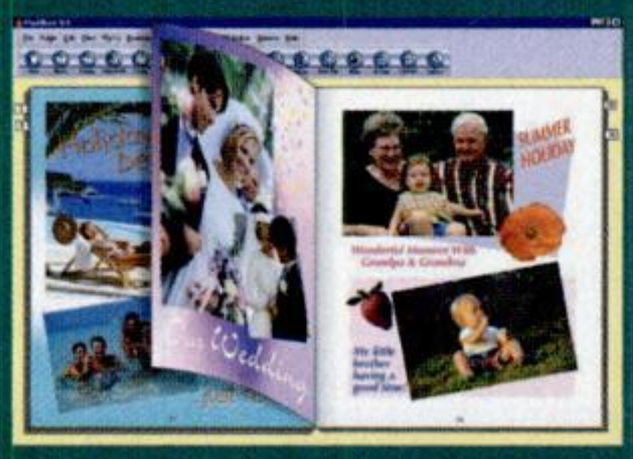

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MAXIMUMPC Rig of the Month

THIS MONTH: Ed Downing's Olde Yankee Fragger

Ed Downing—a 43-year-old printing press operator from Terre Haute, Indiana—claims he has no real woodworking experience, but we're loath to believe him. In fact, we suspect that someday, many, many years from now, someone will show up at the Antiques Roadshow with "The Box," and ask for an explanation of its origins. Then Leigh Keno's great-great-great grandson will explain that the fine piece of woodworking you see on this page was made from "ye olde workshoppe" of one Edward Downing and is a stellar example of LAN party PC craftsmanship circa 2001. "And here is where the proud owner probably stored his 'gaming mouse,'" Keno will say—just before chastising his guest for cleaning the box without the help of a professional conservator.

Hopefully, at the bottom of the box, tucked away in some type of protective sheath, will lie this very Rig of the Month article, a veritable certificate of authenticity, as it were, and a written chronicle of Ed Downing's methods and motivation.

If you have a contender for Rig of the Month, e-mail **input@maximumpc.com** with pics and a brief write-up.

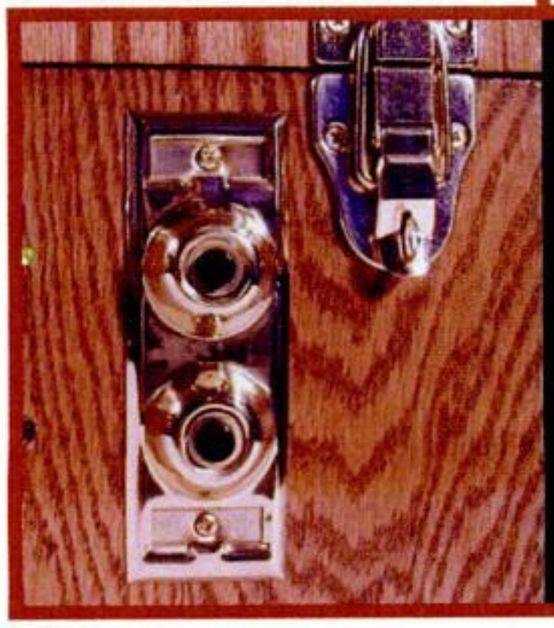
MPC: What inspired you to make such a rig?
We have quite a few local LAN parties, and dragging the full tower to each one was getting to be a hassle. My wife had just purchased several new power tools, including a table saw. We were doing a computer room addition ourselves, and that's when I decided I would make an oak enclosure. I wanted something that was functional, speedy, and good-looking. So "The Box" was born.

MPC: Is this truly a convenient way to carry around a PC?
There were several things I was worried about when I built the rig: Was "The Box" going to be harder to cool, would it sound like a prop plane because of a resonating effect from the wood enclosure, and would the bad boy be liftable? I was pleasantly surprised on all three counts. The weight of the case when filled is 41 lbs. That's not as bad as I thought it would be, and it's more portable than a full tower. My ambient case temp runs at 81°F/27°C; the CPU at 104°F/41°C. The case is quieter than my Supermicro 750a tower. All in all, pretty good!

MPC: What do strangers say when you show up with this thing at LAN parties?
The biggest reaction I get is, "Wow, that's sweet!" Then come the oddball comments like, "Are you moving in?"

MPC: Any danger of this thing catching on fire?
Argh! I hope not!

MPC: The keyboard tray is awesome—what other kinds of mods do you plan to add?
I've been looking for a good 15-inch LCD monitor that has a better response time than 30ms. Apparently Viewsonic has several coming up that may fit the bill. If so, I plan to add a second lid to the box that will house the LCD monitor.



MPC: What inspired you to use doorbell buttons for your power and reset switches?
When designing the case, I decided to use brass as a focal point. I went to many places looking for a moment switch that would look good on the case, but everything was black or red, and very small. Then, while I was at a large building-supply store, it dawned on me that doorbells were moment switches. I saw the one I'm using now and said, "That's it!"

Woodworking aside, "The Box" is packed with some fine hardware. The config includes a Soyo K7V Dragon KT266 motherboard, 512MB of Crucial PC2100 DDR set to CAS2, a 1.4GHz Athlon overclocked to 1.5GHz at default voltage, a VisionTek GeForce3 clocked at 230/265, and two 40GB IBM 60XP hard drives running in RAID 0. Three Global Win fans cool the rig.

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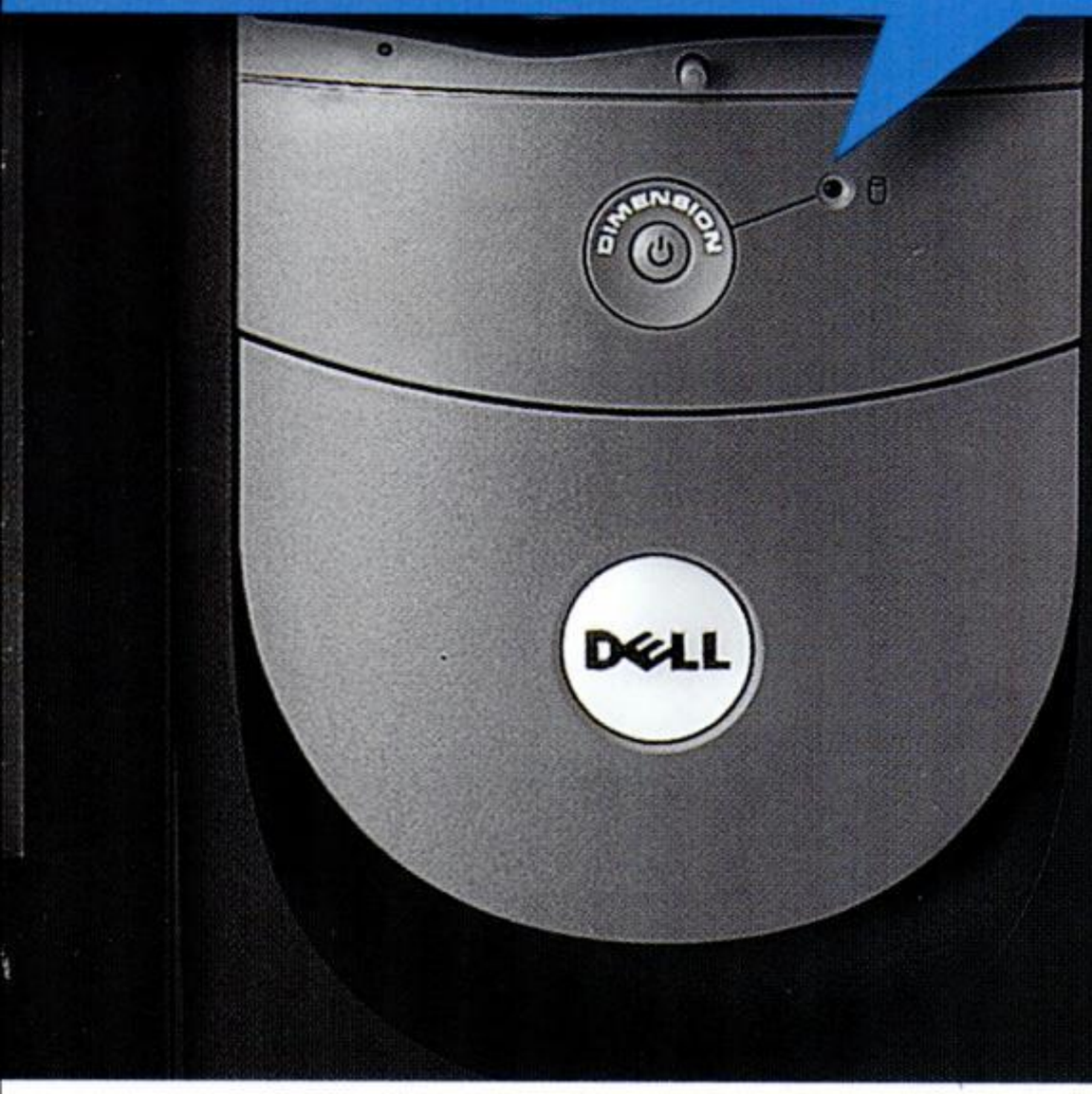

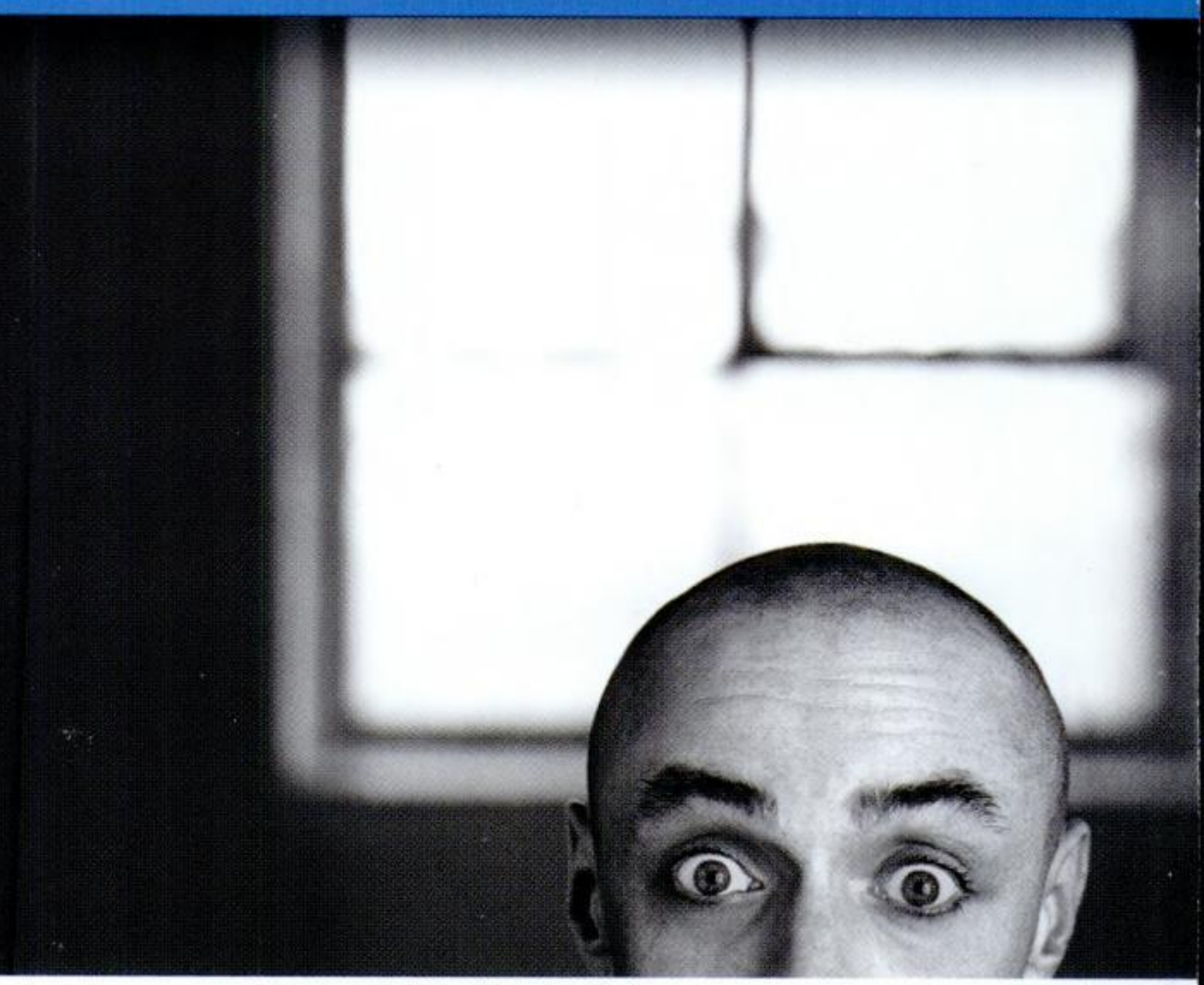

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Dimension™ 8200 Desktop

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- 40GB[5] Ultra ATA/100 Hard Drive (7200RPM)
- 17" (16.0" vis, .28dp) E770 Monitor
- 32MB NVIDIA® GeForce2 MX 4X AGP Graphics Card with TV-Out
- 16X/10X/40X CD-RW Drive with Roxio's Easy CD Creator®
- SB Live! 1024V Digital Sound Card
- Harman Kardon® HK-695 Surround Sound Speakers with Subwoofer
- 56K[6] PCI Telephony Modem for Windows®
- MS® Works Suite 2001, MS® Windows® Me
- 6 Months DellNet™ by MSN® Internet Access[10]
- 1-Yr At-Home Service,[4] 1-Yr Limited Warranty,[2] 1-Yr Phone Support

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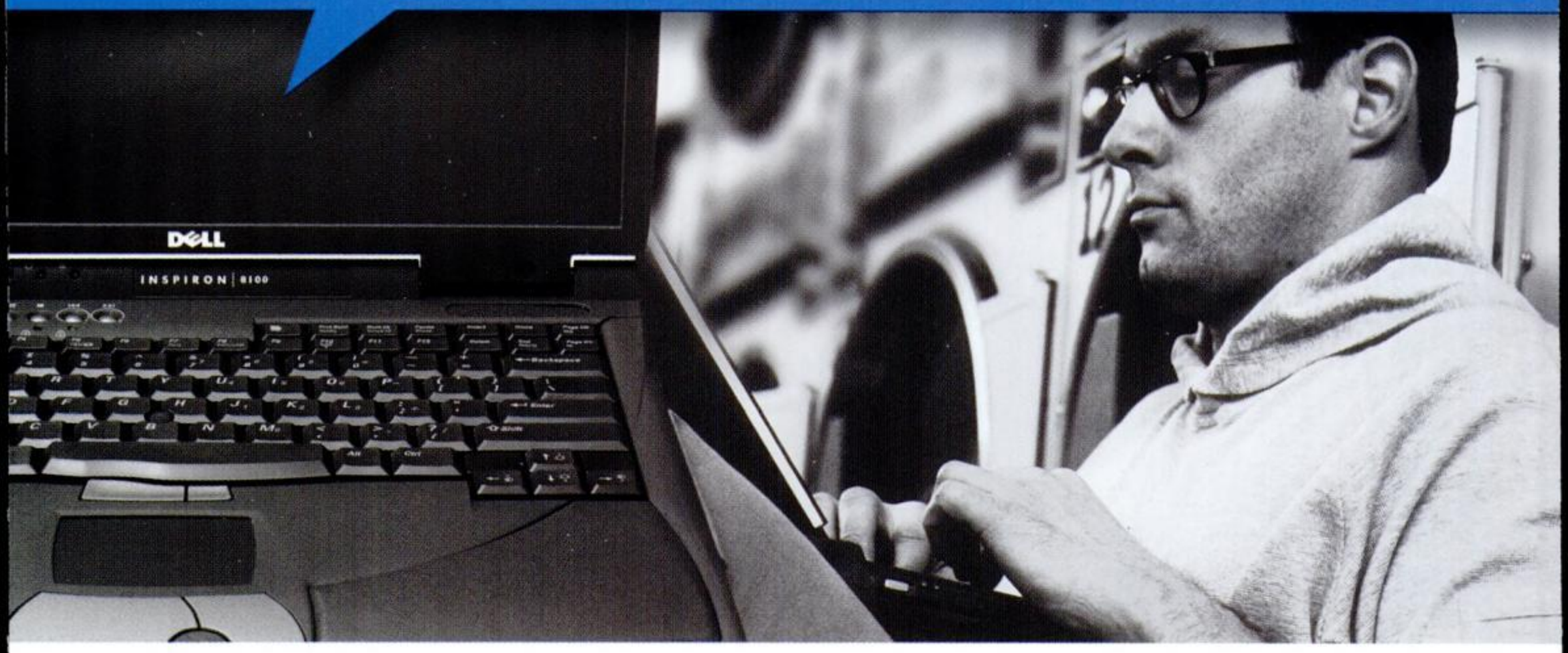

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Inspiron™ 8100 Notebook

- Intel® Pentium® III Processor at 1.13GHz-M featuring Intel® SpeedStep™ Technology
- 15" Super XGA+ TFT Display
- 256MB SDRAM at 133MHz
- 20GB[5] Ultra ATA Hard Drive
- Fixed Internal 8X Max DVD-Rom Drive
- 32MB DDR NVIDIA® GeForce2 Go® 4X AGP 3D Video
- Harman Kardon® Odyssey® Speakers
- 8 Cell Li-Ion Battery with ExpressCharge™ Technology
- Internal 56K[6] FaxModem
- MS® Works Suite 2001, MS® Windows® Me
- 1-Yr Limited Warranty;[2] 1-Yr Mail-in-Service
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